REPUBLIQUE DU CAMEROUN

MINISTERE DE L'ENSEIGNEMENT SUPERIEUR

REPUBLIC OF CAMEROON

MINISTRY OF HIGHER EDUCATION

CAMEROON HIGHER NATIONAL DIPLOMA TRAINING PROGRAM

Volume 1

PRIMARY SECTOR

September 2018

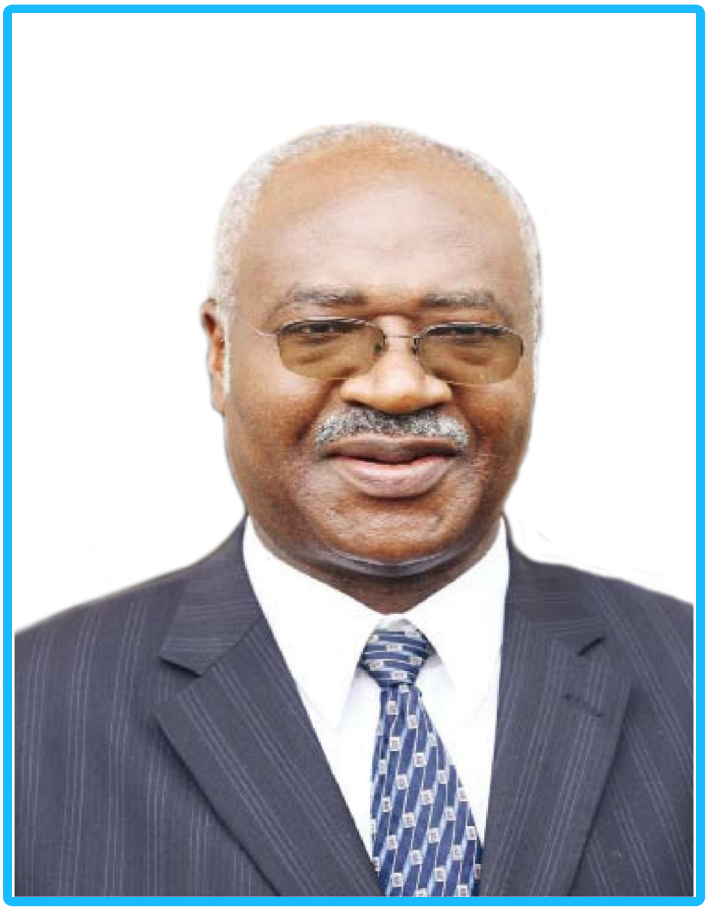
PRIMARY SECTOR

VOLUME 1

H.E. PAUL BIYA

President of the Republic of Cameroon,

”We need to radically transform the image of higher education in Cameroon”
(10th February 2008)



H.E. PHILEMON YANG

Prime Minister, Head of Government,

”In Higher Education, the Government is striving not only to increase and diversify training offers for the Cameroonian youth, but also to ensure quality, social relevance and professionalization of teachings. Furthermore, it is providing better working and living conditions to the members of the university community”

(26th November 2013)

Prof. JACQUES FAME NDONGO

Minister of Higher Education,
Chancellor of Academic Orders

”We must translate into reality the new vision of the University prescribed by the Head of State through far-reaching changes that seek, amongst other things, the improvement of the quality of university services in the areas of teaching and research, to make our universities more attractive and competitive at the national, sub-regional and international levels”

(Excerpt of the New Year Wishes Speech
at the University of Yaounde I, January 2010)

FOREWORD

Since November 2015, the Ministry of Higher Education has undertaken a vast and ambitious operation to review training programmes in the Brevet de Technicien Supérieur (BTS) and Higher National Diploma (HND) cycles. This initiative was incumbent on us as a categorical imperative since it became obvious that the programmes that were so far implemented had become obsolete because of the exponential evolution of the labour market.

If we recall that the programmes in question dated, most of them, as far back as 2001 and that they were developped as institutions and fields of study were set up, one easily understands why their review had become a must. Moreover, the advent of the BMD introduced innovations in our training and certification process that needed to be taken into account, especially as many BTS and HND holders now aspire to register in professional Bachelor's and Master's Degrees.

In order to reconcile this professional requirement with the legitimate need of students to pursue their academic programmes, we requested the support of three main stakeholders : representatives of the business world, teachers-experts from our universities and professional schools, proprietors/proprietresses of Private Institutions of Higher Education.

These three major stakeholders had the opportunity to brainstorm during the two (02) seminars we organized, the first took place on 28th November 2015 and the second on 16th march 2018, at the National Advanced School of Engineering of Yaounde I. The programmes that we are now putting at the disposal of the national university community is the fruit of their deliberations.

We can thus note that, thanks to this brainstorming, new fields of study emerged, others have been redesigned, while others have disappeared altogether, either because the labour market was already saturated, or because they had become inoperative. Trainings identified have been organized according to sectors of activity known to date : primary, secondary, tertiary and quaternary. Within these sectors, they have been divided into training areas, fields of study and specialties. We therefore have 7 major training areas, 21 fields of study and 130 specialties. These training areas have been grouped in a programme-document in 7 volumes, distributed as follows :

Volume 1 : Trainings of the Primary Sector (461 pages) ;

Volume 2 : Trainings of the Secondary Sector (356 pages) ;

Volume 3 : Trainings of the Secondary Sector (Continued) (514 pages) ;

Volume 4 : Trainings of the Tertiary Sector (627 pages) ;

Volume 5 : Trainings of the Tertiary Sector (Continued) (784 pages) ;

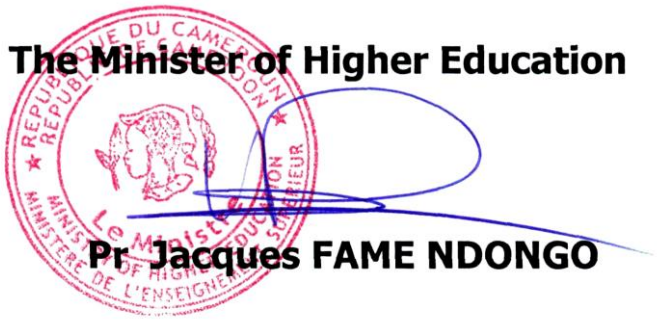
Volume 6 : Trainings of the Tertiary Sector (Continued) (572 pages) ;

Volume 7 : Trainings of the Quaternary Sector (246 pages).

The seven volumes put together make a total of three thousand five hundred and sixty (3560) pages, preceded by a statutory instrument to determine the system of studies and examinations of the Brevet de Technicien Supérieur.

All this arsenal is proof, if any were needed, that our educational and certification system is resolutely embarked on the quest for its effectiveness and social relevance. It is attentive to all innovations and adapts to the developments of our society.

Through this approach, we hope to meet the expectations of our partners and provide the nation with skills that it needs to achieve her emergence by 2035.



REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie
****
MINISTERE DE L'ENSEIGNEMENT SUPERIEUR
****

REPUBLIC OF CAMEROON
Peace-Work-Fatherland
****
MINISTRY OF HIGHER EDUCATION
****

Order No. 18-00866/MINESUP/SG/DDES OF 02 NOV 2018 ESTABLISHING THE SYSTEM OF TRAINING, ASSESSMENTS AND SYLLABI FOR OBTAINING A HIGHER NATIONAL DIPLOMA (HND) IN THE REPUBLIC OF CAMEROON.

THE MINISTER OF HIGHER EDUCATION,

- Mindful of the Constitution.
- Mindful of law No. 2001/005 of April 16th, 2001 on the orientation of Higher Education.
- Mindful of decree No. 2011/408 of December 9th, 2011 to organize the government.
- Mindful of decree No. 2012/433 of October 1st, 2012 to organize the Ministry of Higher Education.
- Mindful of decree No. 93/026 of January 19th, 1993 to create Universities.
- Mindful of decree No. 93/027 of January 19th, 1993 laying down common provisions in state Universities modified and completed by decree No. 2005/345 of September 10th, 2005.
- Mindful of decree No. 2001/882/PM of September 10th, 2001 setting common rules applicable to the private institutions of Higher Education.
- Mindful of Order No.99/005/ MINESUP/DDES OF November 16th, 1999 to give the general depositions applicable to the organization of studies and the evaluation of State Universities of Cameroon.
- Mindful of Order No. 00/0007/MINESUP/SG/DDES/CJ of February 2nd, 2000 to create the National commission of Organization of the Higher National Diploma (HND) Examination.
- Mindful of Order No. 01/0014/MINESUP/DDES of February 26th, 2001 organizing the study schemes and evaluations and setting the study programme fields of the HND in the Republic of Cameroon.

ORDERS:

SECTIONI: GENERAL PROVISIONS

Article 1: This Order deals with the organization of studies, assessments and syllabi of the Higher National Diploma, abbreviated "HND" in Cameroon.

Article 2:(1) The HND is a national certificate of higher education which certifies an academic and technical qualification in two years or four semesters of study after the acquisition of the Baccalaureate Certificate or General Certificate of Education, Advanced Level.

(2) It certifies that the graduate can hold a position of a senior technician and can use his / her knowledge and skills to improve upon himself / herself or pursue university studies in his/her field of study.

(3) The HND shall indicate the sector, the field and the professional specialty in accordance with the training pursued by its holder;

Article 3: (1) The HND is defined by a standard that is characteristic of the professional and cross-disciplinary skills required to obtain it.

(2) The standard referred to in paragraph (1) of this article is defined by domain and for each field by an order from the Minister of Higher Education. It lists the abilities that the diploma holders must have, specifies the knowledge and skills that must be acquired and indicates the requirements needed to obtain the certificate.

Article 4: Only public or private institutions of higher education duly authorized by the Minister of Higher Education can provide courses preparing candidates for the HND.

SECTION II: THE ORGANIZATION OF STUDY

Article 5:(1) Studies for the HND must last two (2) academic years or four (4) semesters after acquisition of the Baccalaureate certificate, the General Certificate of Education, Advanced Level or any diploma or certificate deemed equivalent pursuant to Article (2) above at the end of Secondary Education.

(2) However, some training programmes may require one year of preparation or upgrading, without any modification of the academic base set in Article (2) above.

(3) Where necessary, a specific text of the Minister of Higher Education shall specify the training programmes referred to in paragraph (2) of this article.

Article 6: (1) The academic year is subdivided into two (02) semesters. A semester consists of fourteen (14) to sixteen (16) weeks dedicated to teaching and assessment.

(2) Each semester ends with an examination session comprising a regular session and a resit session open to students who fail in the regular session under conditions set by regulatory texts.

Article 7: (1) Courses taught in Higher Education Institutions are organised following a structured programme.

(2) One semester has seven (7) Courses (C) with a total of 30 credits.

(3) A Course is an identifiable group of objectives and outcomes called Constituent Elements (CEs) that are scientifically coherent and specific. Each Course has a value defined in number of adjustable credits based on the pertinence of the Constituent Elements.

(4) The Constituent Elements of a CU (CECU) comprise several forms of teaching: Lectures (L), Practical work (P), Tutorials (T), Student's Personal Work (SPW); activities applied in the form of internships in companies, projects, (remove) or end-of-study projects.

Article 8: (1) Credit is a value or unit that is used to quantify the total workload required for the student to achieve the training objective of a CU. The number of credits allocated to each semester is thirty (30) for all the CUs of the semester. The number of hours to be taught for a credit is fifteen (15) hours spread weekly in one semester.

(2) The credits are only obtained after work has been carried out, after an appropriate assessment either during a semester, or during a year, or at the end of the course.

Article 9: (1) The courses are structured into compulsory Courses and Elective courses.

(2) The compulsory CUs are the set of CUs that students enrolled in an HND cycle must offer. They constitute (90%) of credits of all the CUs of the training and (100%) of credits of the

official program published by the Minister of Higher Education and required for the National Examination. They are divided into three categories:

- The compulsory CUs linked to the discipline or disciplines corresponding to the field, representing (30%) of the overall hours taught and credits allocated to the compulsory CUs.

- Professional CUs organized around technical and professional contents representing (60%) of the overall hours taught and credits allocated to the compulsory CUs.

-Cross-discipline CUs linked to complementary training in different domains, representing (10%) of the hours taught and compulsory CU credits.

(3) Elective CUs organised by each institution per its specificity, allowing the student to deepen his specialization or explore to other fields of knowledge.

Article 10: The Higher National Diploma cycle is done in four (04) semesters. The hours taught for a lecture credit is 15 hours, a total of 30 credits per semester consist of 450 hours of courses per semester. There is a total of 120 credits making 1800 hours of lectures for all the training in 2 years, distributed as follows per semester:

a) Fundamental courses; 2 CU, 9 credits, 135 hours.
b) Professional courses; 4 CU, 18 credits, 270 hours.
c) Cross-discipline courses; 1 CU, 3 credits, 45 hours

Article 11: The teaching of French and English is compulsory throughout the training in accordance with the national decision on bilingualism. Likewise, the teaching of civics and ethical education is recommended throughout the training cycle.

Article12: The student is enrolled in a specialisation that he/she keeps throughout his/her training. He /She takes the cross-disciplinary lessons in general including classical aspects of the training.

Article 13: Practical lessons constitutes a decisive phase and is an indispensable base of the training.

SECTION III: INTERNSHIP IN A PROFESSIONAL MILIEU

Article 14: Each specialisation includes practical internships in companies. All HND candidates must complete an internship in a professional setting in one or more companies in the sector corresponding to their training.

Article 15: The internship in a professional setting aims at complementing the training of the candidate through the experience of professional practices corresponding to the skills required. It also allows the student to acquire qualities of rationality, professional aptitude and behaviours, and to develop a sense of responsibility by gradually adapting to the requirements of the job.

Article 16: (1) Internship in a professional setting is organized throughout the training leading to the HND. It constitutes an important and essential part of the student's training.

(2) No special provision may exempt an HND candidate from the obligation of carrying out an internship in a professional setting, referred to in paragraph (1) of this Article.

Article 17: (1) The search for companies or establishments to receive trainee students and the negotiation of the contents of the internship are carried out jointly by the student and the persons in charge of his/her training institution.

(2) The student's training institution is responsible in its entirety for the organisation of internship periods, their monitoring and their educational content.

(3) At the end of the internship, the candidate must produce an internship report.

(4) The institution must take all steps to find an internship for the student when the latter reports with evidence that his/her attempts to find an internship were unsuccessful.

Article 18: Internship in a professional setting is a Professional Course whose objectives and outcomes are considered in the assessments.

SECTION IV: TRAINING PROGRAM

Article 19: - The training to obtain the HND is structured into Sectors, Domains, Fields, Specialities and Options:

- A Sector consists of Domains;
-A Domain consists of Fields;
-A Field consists of Specialities from the same work-related group.
-A Speciality is a grouping of subjects forming a job profile required by the labour market.
-A Speciality may consist of options.

Article 20: The different sectors are as follows:

- Primary sector;
- Secondary sector:
- Tertiary sector;
- Quaternary sector.

Article 21: These sectors consist of the following domains:

-The primary sector includes the agro-pastoral domain, and the Water and Environmental domain.
-The secondary sector includes Industry and Technology.
-The tertiary sector includes the domains of Commerce, Management, Law, Tourism, Hospitality, Social Sciences, and Health.
-The quaternary sector includes the domains of Information and Communication Technologies

Article 22: (1) The following specialities are open in the following domains:

PRIMARY SECTOR
DOMAIN: AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Field: Agricultural And Food Sciences
Specialties

1- Agricultural Engineering
2- Food Technology
3- Animal Production Technology

4- Crop Production Technology
5- Fisheries Management
6- Agro-pastoral adviser
7- Agro pastoral Entrepreneurship
8- Agricultural Business Technics
9-Aquaculture
10-Agricultural Production Technology

Field : Environmental Sciences
Specialties

1-Agro-Forestry and Forest Management
2- Nature Management and Protection
3-Risk Management
4-Pollution Prevention and Remediation
5- Meteorology
6- Solid Waste Management
7- Wildlife Management
8-Environmental Impact Assessment
9-Forest Engineering

Field :Water Engineering And Management
Specialties

1- Hydrology and Water Resources Management
2-Hydrogeology and Groundwater Management
3- Waste Water Management
4-Hydraulic Engineering and Water Infrastructure
5-Integrated Water Resource Management

SECONDARY SECTOR

DOMAIN: ENGINEERING AND TECHNOLOGY

Field: Civil Engineering

Specialties

1-Civil Engineering Technology
2- Topography
3-Urban Planning
4-Geotechnics
5-Sanitary Installation and Plumbing
6- Building Science and Technology
7- Wood Works
Options: 7-1-Carpentry
7-2- Joinery And Cabinetmaking
8- Real Estate Maintenance

9- Roads and Civil Engineering

Field:Mechanical Engineering Specialties

1-Metal Construction
2-Mechanical Manufacturing
3-Mechanical Construction
4- Boiler making and Welding

Field:Chemical Engineering Specialties

1-Chemical Manufacturing
2-Chemical Process Technology
3-Chemical Laboratory Technology

Field:Biological engineering Specialities

1-Agricultural Biotechnology

Field: Electrical and Electronic Engineering Specialties

1-Electronics
2-Electrotechnics
3-Electrical Power System
4- Maintenance of Industrial system
5-Maintenance of Biomedical Equipment
6-Control Instrumentation and Regulation

Field : Thermal and Energy Engineering Specialties

1-Air conditioning and Refrigeration
2-Sustenability and Renewable energy
3-Maintenance and management of fluid system

Field : Petroleum And Mining Engineering Specialties

1-Applied Geology
2-Drilling Technology
3- Quarries Operations
4- Petroleum Systems and Exploitation
5-Petroleum Logistics

TERTIARY SECTOR

DOMAIN: MANAGEMENT, BUSINESS STUDIES AND LEGAL CAREERS

Field : Management

Specialties

1- Assistant Manager
2-Operation of Air Transport
3- Management of Non-Governmental Organization (NGO'S)
4- Project Management
5- Human Resource Management
6- Quality Management
7- Logistics and Transport Management
8- Sport Management
9- Information Systems Management
10-Local Government Management
Options: 10-1 Accounting and Finance
10-2 Local Government Taxation
10-3 Local Government Administration
11- Statistics
12-Events Management
13-Port Shipping Management

Field: Business and Finance
Specialties

1-Accountancy
2-Marketing- Trade-Sale
3- Banking and Finance
4- International Trade
5-Microfinance
6-Insurance

Field: Legal Careers
Specialties

1- Legal Assistant
2-Business Law
3- Land Law
4-Stock Market Career
5-Customs and Transit .
6-Tax Management

DOMAIN: HOME ECONOMICS, TOURISM AND HOTEL MANAGEMENT,

Field : Home Economics and Social Work
Specialties

1- Bakery and Food Processing
2- Fashion, Clothing and Textiles
3-Beauty-Esthetics
Options: 3-1-Beauty care and Cosmetics
3-2 -Hairdressing Professions

4- Social Work

Field: Tourism and Hotel Management

Specialties

1-Tourism and Travel Agency Management
2- Hotel Management And Catering

DOMAIN: ARTS AND CULTURE, EDUCATION AND COMMUNICATION

Field: Education

Specialties

1-Didactics, Curriculum Development and Teaching
2-Education Management and Administration
3-Special Education
4-Distance and Continuing Education
5-Vocational Guidance and Counseling
6-Andragogy

Field: Communication

Specialties

1-Journalism
2-Advertisingand Public Relations
3-Corporate Communication
4-Printing, Editing and Publishing
5-Media photography and Audio visual

Field: Arts And Culture

Specialties

1-Gastronomic Arts
2-Cinematography
3-Sculpture
4-Caricature, Illustration and Comic Arts
5-Cartoon
6- Art Design
Options 6-1-Product Design
6-2-Graphic Design
6-3-Fashion Design
6-4-Interior Design
7-Performing Arts
8-Musicology
9- Painting

DOMAIN: HEALTH

Field : Medical and Biomedical Sciences

Specialties

1-Nursing
2-Medical Laboratory Sciences
3-Medical Imaging Technology
4-Pharmacy Technology
5- Dental Therapy
6-Dental Prosthesis
7-Midwifery
8-Optician/Clinical Optometry
9-Physiotherapy
10-Nutrition and Dietetics
11-Health Care Management
12-Health Sanitary Inspector
13- Ophthalmic Technician
14- Ultrasonography
15- Prosthesis and Orthotics

QUATERNARY SECTOR

DOMAIN: INFORMATION AND COMMUNICATION TECHNOLOGY

Field : Networks and Telecommunication

Specialties

1-Telecommunication
2-Network and Security

Field: Computer Engineering
Specialties

1-Computer Engineering
Options 1-1-Software Engineering
1-2-Computer Science and Networks
1-3-Data Base Management
2-Computer Maintenance
Option 2-1Hardware Maintenance
3-Industrial Computing and Automation
4-Computer Graphics and Web Design
5- E-commerce and Digital Marketing

(2) Other specialities and options may be created when the need arises, by Order of the Minister in charge of Higher Education.

SECTION V: ASSESSMENTS

Article 23 : (1) Courses are evaluated from 0 to 100.

(2) No one may be admitted to take a Course unless he has obtained an average score of at least 50 out of 100 for all the Constituent elements of the CU.

(3) Assessment is carried out per Course. The test may consist of several sections corresponding to the constituent elements of the CU.

Article 24: (1) Except for the professional internship CU, each CU is assessed as follows per level:

- Continuous assessment: 30% of the points
- Written examination: 70% of the points

(2) The continuous assessment mark includes marks for the following:

- Participation in tutorials and practical work;
- Written Tests
- Oral questions;
- Presentations;
- Projects.

(3) The professional internship Course includes at least two Constituent elements, one of which is dedicated to the company experience and the other to the end of training report and its defence.

Article 25: (1) Continuous Assessment marks are on the competence of each authorized teacher who teaches the corresponding course. At least one continuous assessment mark is required per course.

(2) The written examinations referred to in paragraph (1) of Article (24) above and all activities involved in evaluation per level are organized under the responsibility of the Management of each institution authorized to provide HND training and under the supervision of the Institution which ensures the academic supervision of the Institution concerned in accordance with the regulations in force.

(3) The transition from level 1 to level 2 is conditioned by a pass in all the CUs.

Article 26: (1) A National Examination taking place in a single annual session shall approve the completion of studies carried out in accordance with the provisions of this Order.

(2) The General Regulations of the National Examination for obtaining the Higher National Diploma are fixed when necessary by the Minister of Higher Education on the proposal of the National Commission for the Organization of National Examinations.

SECTION VI: TEACHING SYLLABUS

Article 27: The teaching syllabus of the training leading to the acquisition of the Higher National Diploma presented by sectors, domains, fields, specialities and possibly by options are annexed to this order.

Article 28: The effective opening of an HND training in an authorised public or private Institution for a field, a speciality or a given option, can occur only after a specific text of the Minister of Higher Education establishing teaching syllabuses of corresponding courses has been issued.

SECTION VII: FINAL PROVISIONS

Article 29: This order repeals all prior contrary provisions including Order No. 01/0014/MINESUP/DDES of 26 February 2001 organising the system of studies and assessments and setting the syllabus for HND courses in the Republic of Cameroon, as well as those of Order No. 05/0020/MINESUP of 12 January 2005 on the creation, system of studies, assessments and syllabi of the Higher Professional Diploma (HPD) of Higher Education Institutions of Cameroon.

Article 30: This order takes effect as of the 2018/2019 academic year.

Article 31: During the effective implementation of the new HND fields, the courses leading to HPD remain valid for a period of three (03) years.

Article 32: Heads of University Institutions, Heads of Authorized Institutions, the President of the National Commission for the Organization of National Examinations, the President of the National Commission for Private Higher Education and the Director of Development of Higher Education are responsible, in their respective spheres of competence for the implementation of this order which shall be registered and published in the official gazette in French and English.

THE MINISTER OF HIGHER EDUCATION,

SUMMARY

FOREWORD 2

DOMAIN : **AGRICULTURAL AND ENVIRONMENTAL SCIENCES**

Field : **AGRICUTURAL AND FOOD SCIENCES**

AGRICULTURAL ENGINEERING 7

FOOD TECHNOLOGY 33

ANIMAL PRODUCTION TECHNOLOGY 63

CROP PRODUCTION TECHNOLOGY 82

FISHERIES MANAGEMENT 103

AGROPASTORAL ADVICE 121

AGROPASTORAL ENTREPRENEURSHIP 142

AGRICULTURAL BUSINESS TECHNICS 167

AQUACULTURE 182

AGRICULTURAL PRODUCTION TECHNOLOGY 202

Field : **ENVIRONMENTAL SCIENCES SPECIALITIES**

AGRO-FORESTRY AND FOREST MANAGEMENT 238

NATURE MANAGEMENT AND PROTECTION 256

RISK MANAGEMENT 272

POLLUTION PREVENTION AND REMEDIATION 289

METEOROLOGY 304

SOLID WASTE MANAGEMENT 315

WILDLIFE MANAGEMENT 328
ENVIRONMENTAL IMPACT ASSESSMENT.....341
FORESTRY ENGINEERING 354

Field : **WATER ENGINEERING AND MANAGEMENT**

HYDROLOGY AND WATER RESOURCES MANAGEMENT 368
HYDROGEOLOGY AND GROUNDWATER MANAGEMENT.....388
WASTE WATER MANAGEMENT 408
HYDRAULIC ENGINEERING AND WATER INFRASTRUCTURE.....429
INTEGRATED WATER RESOURCE MANAGEMENT 447

DOMAIN

AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AGRICULTURAL ENGINEERING

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Agricultural Engineering

1. The objective of the training

Training student in agricultural engineering aims at fulfilling Cameroon second generation agriculture policy, to developing a vision of self-reliant and effective indigenous development agro-industrial manpower and resources. Agricultural engineering use engineering science to solve problems in the agricultural industry. They design, develop, test and manage agricultural machinery and equipment.

2. Skills sought after

→ **General skills**

- Mastery of basic ICT tools;
- Developing professional attitude in respect of deontology and ethics;
- Working as a team in training environment and in a practical environment;
- Understanding the functioning of organisations;
- Working in a multicultural environment;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Creating and managing a business;
- Progressively developing an independent learning ability in order to be able to pursue one's personal and professional development throughout one's career.

→ **Specific Skills**

- Develop a vision and passion for food mechanized and production systems;
- Acquire skills in farm power, field crop, livestock, farm and homestead processing and preparation equipment, utensils and appliances engineering;
- Farmstead and animal barns engineering;
- Farm energy and water system engineering;
- Farm equipment installation, training and rescuers.

3. Career opportunities

- Ministries involved and related with agriculture;
- Agro-industry machines, utensil and appliances manufacture;
- Sales and services (installation, use –training, rescuers) of agricultural equipment

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Engineering					
Course Code	Course titles	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AEG111	Physics and Chemistry	45	20	5	5	75	5
AEG112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AEG113	General Agronomy	30	20	5	5	60	4
AEG114	Engineering Mechanics	35	15	5	5	60	4
AEG115	Farm Crop Machines/ Farm Animal Machines	40	15	15	5	75	5
AEG116	Manufacturing Engineering	40	15	15	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AEG117	Basic French/English	30	10	-	5	45	3
Total		**250**	**115**	**50**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Engineering					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AEG121	Soil Mechanics	40	20	10	5	75	5
AEG122	Engineering Thermodynamics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AEG123	Farm Power	40	15	15	5	75	5
AEG124	Crop and animal infrastructure	40	15	15	5	75	5
AEG125	Farm Machinery & Earth Moving Equipment	35	15	5	5	60	4
AEG126	Agricultural Processing Engineering	30	10	15	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AEG127	Civic and Ethical Education /Initiation to the Law	20	10	10	5	45	3
Total		**205**	**95**	**120**	**30**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Engineering					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AEG231	Basic Mechanical Engineering	30	20	5	5	60	4
AEG232	Statistics and Probability	40	15	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AEG233	Flesh Food Processing Machinery/ Food Crop Processing Machinery	30	20	20	5	75	5
AEG234	Post Harvest Engineering	40	20	10	5	75	5
AEG235	Soil & Water Conservation Engineering	30	20	5	5	60	4
AEG236	Farm Machinery Management	10	-	30	20	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AEG237	Computer and multimedia	20	10	10	5	45	3
Total		**200**	**105**	**95**	**50**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Engineering					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AEG241	Engineering Economics & Management	40	15	15	5	75	5
AEG242	Rural Sociology	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AEG243	Maintenance of equipment	30	20	5	5	60	4
AEG244	Irrigation Water Management Techniques	30	20	5	5	60	4
AEG245	Hydraulic Machinery and water engineering	30	10	15	5	60	4
AEG246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AEG247	Economics and business management	20	10	10	5	45	3
Total		**190**	**105**	**95**	**60**	**450**	**30**

SPW: Students' Personal Work

5. Courses content

❖ AEG 111 : Physics and Chemistry

➢ Physics /Chemistry: 4 credits (60 hours); L, T, P, SPW

A. Physics

Objective: Acquaintance of students with the physics of electrical and electronic materials, components, and devices.

Contents:

Electricity and Magnetism: Voltage, current, resistance, power, single phase and 3 phase A.C. supply. Series and parallel circuits. Vector addition and subtraction of A.C. voltages. A.C/D.C. motors: Concept of rotating fields, polyphase induction motor, lap and wave winding of single phase and three phase motors, torque and starting characteristics, measuring instruments, transformers. A.C power generators. Electrical distribution and wiring for farm buildings. Electric controls, motor controls, and protection. Selection of farm motors, applications of electricity at farm. Electronics: Semi-conductors, PN-junction; Transistor; its characteristics and uses; Amplifiers; Power supplies; Magnetism: Electro-Megnetic induction and radiation; Radioactivity: Radio isotopes; Biological effects of radiation; Laser: Introduction, generation and uses of Laser. Fiber optics–characteristics.

Practical:

Construction of wiring systems, fuses, switches of various types insulators
Circuits design and drawing of a typical farm electrical system.
Selection of motor for various farm equipment such as forage cutter, feed-grinders, and shop tools.
Practice on repair and adjustment of electric motors, switches, fuses, transmission wiring controls
Study of 3 phase induction motor
Study of star and delta connections
Study of semi conductor, triode, diode valve and transistors.
Use of AVO meter, CRO, planimeter
Fabrication of full wave rectifier and inductance study of its wave-shape.
Measurement of self-inductance and mutual inductance

B. Chemistry

Mineral chemistry: Fundamental Concepts: Reminder of the notions of atom, molecule and mole, etc.… ; Electro negativity of the elements, types of connections, isometry, nomenclature; Study Summary of elements of the blocks Study Summary of elements of the block P; Summary Study of the transition elements.
Organic chemistry **:**Fundamental concepts; Metal networks; Ionic networks; Molecular networks; The main functions of the organic chemistry; Alkanes, cyclo-alkanes, alkenes, alkynes, aromatic; Halogen drifts; Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.

❖ AEG 112 : Mathematics

➢ Mathematics : 5 credits (75 hours); L, T, P, SPW

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

1. Suites and actual series
2. Numerical Functions
3. Full calculation (primitives, surface integral and volume)
4. Differential Equation of the first and second-order
5. Use of computer tools for the resolution of equations
6. Vector space

❖ AEG 113 : General Agronomy

➢ General Agronomy : 4 credits (60 hours); L, T, P, SPW

Objective: To familiarize students with the basic concepts of crop and animal husbandry.

Introduction:

Introduction to the Engineering Profession and its Fields of Specialization with particular emphasis on Agricultural Engineering.
Crop and Animal Production: Factors affecting crop and animal production and distribution. Requirements for agricultural development. Classification of field crops based on agronomic use, special purpose and other basis.
Seed Technology: Role of seed in crop production. Concept of seed technology. Seed Structure and growth, Dormancy, Seed Production and its quality, Seed Processing and Seed Storage.
Farming Systems And Tillage Practices: Crop rotation. Definition and computation of cropping intensity. Farming systems and its kinds. Objectives of tillage. Effect of tillage on soil conditions, plant diseases and insects.
Dry Land Farming: Agro-ecological zones, Problems and constraints of dry land, Dry land improvement, Dry land management.
Land Resources And Management: Soil zones and Soil resources. Sustainability of land resources. Managing soil resources.
Agro-Meteorology: Introduction, Weather and climate, Climatic components, Classification of climates, Climatic factors and crop production.
Agro-Ecology: Introduction, Agro-ecological Features, Agro-ecological zones

❖ AEG 114 : Engineering Mechanics

➢ Engineering Mechanics: 4 credits (60 hours); L, T, P, SPW

Objective : Teaching basic principles of force analyses in engineering systems

Content:

Concept of measurement of mass, force, time and space, Systems of units, Fundamentals & Derived units, Conversion of units, required Accuracy of results, General Principles of Statics, Vector addition, Subtraction and Products, Resultant of Distributed (Linear & Non-linear) force Systems, General conditions of equilibrium of Co-planer forces, Laws of Triangle, Parallelogram and Polygon of forces, Types of beams, Supports and Loads, Simple cases of Axial forces, Shear forces and Bending Moment diagrams, Problem involving friction on Flat surfaces, Geometrical Properties of Plane Areas, Work, Energy, Power, Impulse, Momentum, Conservation of Momentum and Energy, Rectilinear and Curvilinear motions, Tangential and Normal Components of Acceleration, Simple Harmonic motion

Practical:

Verify the law of polygon of forces, the law of parallelogram of forces, the principles of moments, the co-efficient of friction between surfaces. Special numerical problems and assignments.
Moment of inertia of fly wheel mounted on wall and a wooden block by suspension. Efficiency of various models of machines. Modulus of rigidity of metal bar by static and dynamic methods. Special numerical problems and assignments.

❖ AEG 115 : Farm Crop Machines/ Farm Animal Machines

- **Farm Crop Machines/ Farm Animal Machines : 5 credits (75 hours); L, T, P, SPW**

A. Farm Crop Machines

Objective: Develop skills in the mechanization crop production on various types of farms in Cameroon

1. Land clearing, tilling, planting machines
2. Weed, pests/diseases control mechanism and machinery
3. Harvesting crops, vegetables, fruits, cereals, legumes, roots and tubers
4. Post-harvest and transportation machinery
5. Food crop storage engineering

B. Farm Animal Machines

Objective: Acquire skills in flesh food mechanization

1. Feeding systems engineering
2. Egg collector, washer and packaging: incubators, hatchers
3. Animal catchers; farm waste disposal systems
4. Farm measures, lifts, loading system engineering
5. Feed mills (feedstuff loading, grinders, crushers, systems)

❖ AEG 116 : Manufacturing Engineering

➢ Manufacturing Engineering: 5 credits (75 hours); L, T, P, SPW

Objective : Student's preparation in the processes required for manufacturing agricultural machines.

Content :

Turning and related operations: Lathe, construction, types of lathes, accessories, lathe operations, turret lathe; construction, types, turret lathe tooling, chip formation, mechanism of chip formation, cutting tool materials, tool failure and tool life.
Shaping and planning: shaper; classifications, functions, shaper drive mechanism, shaper speeds and machining times, planning, construction and types, work set up, planer tools, metal bending and sheet rolling processes.
Drilling and reaming: Drilling; types and sizes, drill chucks. Counter boring, counter sinking, reaming, drilling machine types, and estimating drilling time.
Milling: Definition, milling operations, milling cutters, milling machines types, size, accessories, dividing head, estimating milling time.
Gear manufacturing: Gear terminology, gear types, basic methods for machining gears.
Computer-aided manufacturing (CAM) and computer integrated manufacturing (CIM) Systems: Machine tools control, numerical control system, computerized numerical control system (CNC) programming for numerical control. Automatic machines, transfer machines, computer aided- manufacturing (CAM), computer simulation of manufacturing process and system. Automated assembly use of mechanical hands/Industrial Robots, concept of computer-integrated automation system (unmanned factory)

Practical:

1. Fabrication of various machine elements using lathe.
2. Making a slot on a shaft for a cotter pin using shaper and milling machines
3. Cutting threads using milling and lathe machines
4. Making holes in machine parts using drilling machines.
5. Making bends of metal sheet using sheet rolling machines
6. Fabrication of a given agricultural machinery part.
7. Local visits to agricultural Machinery Manufacturing Industries.

❖ AEG 117 : Basic French/English

➢ Bilingual Training: 3 credits (45 hours); L, T, SPW

A. English :

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions

- Continuous oral communication: Show, explain, develop, summarize, account, comment;
- Interactions oral communication

4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

B. French :

1. **Vocabulaire**
   - Vocabulaire technique usuel
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ AEG 121 : Soil Mechanics

➢ Soil Mechanics : 5 credits (75 hours); L, T, P, SPW

Soil Formation: Soil and its Constituents, Weathering of Rocks and Types of Soils, Description and identification of soil (Visual-Manual Procedure), Mineralogy of Solids.

Physical Properties: Water Content, Void Ratio, Porosity, Degree of Saturation, Specific Gravity, Unit Weight and their determination, Atterberg limits, Sieve Analysis, Hydrometer and Pipette Analysis, Stoke's Law, Grain Size distribution

Classification of Soils: Grain Size Classification; Bureau of Soils, Classification systems. Textural Classification by Triangular Chart, Unified Soil Classification.

Permeability and Seepage: Definition, Hydraulic Gradient, Darcy's Law, Factors affecting Permeability, Permeability of stratified soils, Laboratory and Field determination of coefficient of Permeability, Seepage Force, Quick Sand Condition, Flow nets, Boundary Conditions, Graphical Method of Flow net construction, Determination of Quantity of Seepage, Two Dimensional Flow, Laplace Equation, seepage through Earth Dams, Design of Filters

Compaction: Purpose and theory of Compaction, Moisture Content and Dry Density relationship, Standard Proctor Compaction Test, Modified Proctor compaction Test, Degree of Compaction and its determination in the Field. Methods of compaction in the field; Factors affecting compaction of soils.

Vertical Stresses in Soils:

Definition, Stresses caused by self-weight of soil, Geostatic stresses, stresses caused by Point Loads and Uniformly distributed Loads: Boussinesq and Westergarrd theories, Pressure bulb, Stress distribution diagram on horizontal and vertical, Stress at a point outside loaded area, Newmark's charts and 2:1 Method

Soil Exploration: Importance of Soil Exploration, Soil Exploration methods, Probing, Test Trenches and Pits, Auger boring, wash boring, rotary boring, Percussion drilling and Geophysical methods, Sol Samples, Disturbed and Un-disturbed samples, In-situ Tests (SPT, CPT and PLT)

Practical :

1. Identification of Soil (Visual and Manual)
2. Determination of Moisture Content of Soil
3. Determination of Specific Gravity of Soil
4. Determination of Liquid Limit of Soil
5. Grain Analysis of Soil (including both Mechanical and Hydrometer Analysis)
6. Determination of Plastic Limit and Plasticity Index of Soil
7. Determination of Shrinkage Limit of Soil
8. Classification of Soil
9. Modified/Proctor Compaction Test
10. Constant Head Permeability Test (Granular Soil)
11. Falling Head Permeability (Granular and Fine Grained Soils)

❖ AEG 122 : Engineering Thermodynamics

➢ Engineering Thermodynamics : 4 credits (60 hours); L, T, P, SPW

Objective: To give basic understanding of the subject to undergraduate students for Agriculture power units and machines.

Content:

Heating and expansion of gases. Units of heat, gases and vapours, constant volume and constant pressure, P-V diagram, specific heat of gases, internal energy of gas, law of conservation of energy, methods of heating and expanding gases and vapours, work done by gas in expanding.

Laws of perfect gases: The two laws of thermodynamics, the heating of gases, equations for different types of heating methods.

Air cycles: Cycles of operation, air standard efficiency of a cycle, reversible process, reversible cycles, reversibility and efficiency, Carnot cycle, Otto cycle, diesel cycle, mean effective pressure.

Entropy of gases: Entropy and heat, T-S diagrams, Carnot, Otto, diesel and dual combustion cycles on T-S diagrams.

Air compressors: functions, compressor types, , reciprocating and rotary compressors, single and multistage compressors, cylinder clearance, work done, compressor efficiency.

Compound expansion: advantages of compound expansion, tandem type of two-cylinder compound engine, receiver type compound engine; combined indicator diagram for compound engine, Calculations for cylinder uniflow engine.

Fuels: Combustion of fuels, properties of fuels – viscosity, pour point, flash point, calorific value, API gravity, conversion of volumetric analysis, analysis by weight, weight of carbon in burnt gases, weight of air required for complete combustion of fuel, weight of flue gases per pound of fuel burnt, weight of excess air supplied, method of analyzing flue gases, heat carried away by flue gases, volumetric analysis of a gas, air fuel ratio for I.C. Engine.

Refrigeration: Co efficient of performance, units of refrigeration, air compression refrigeration, vapour compression refrigeration, refrigeration cycles, rating, quality of refrigerant and general considerations, components of refrigeration system, heat pumps.

Practical:

1. Study of working principles of two stroke and four stroke engines using models.
2. Demonstration of Joule's law.
3. Study of rotary and reciprocating air compressors and their characteristic curves.
4. Study of PV diagram of diesel/gasoline engines.
5. Analysis of engine flue gases for CO, CO2, NO2, etc.
6. Determination of energy content of different fuels using calorimeter.
7. Study of heat transfer using refrigeration and air conditioning cycle.

❖ AEG 123 : Farm Power

➢ Farm Power: 5 credits (75 hours); L, T, P, SPW

Objective : Providing instructions relating components of I.C. engine, tractor components and its mechanics

Content :

Introduction: History of engine development, engine cycles, principles of operation, types of engines.

Principal parts of engine: Functions, construction, cylinder, cylinder heads, liner, crank case, piston, connecting rod, crank shaft, clutch, flywheel, valves and their operation, valve mechanism.

Fuels and combustion: Types of engine fuels, fuel tests and their significance, gasoline tests, antiknock test, octane number, volatility, Reid vapour pressure, sulphur content, gun content, heat values, gasoline additives. Engine emissions and their analysis.

Fuel System: major components of fuel systems (petrol / diesel), carburettor, fuel injection pump, injector/nozzles, electronic fuel injection, governing system, trouble shooting, calibration of fuel injection pump.

Ignition system: Types of ignition, spark, magneto and compression ignition, induction coils, distributor, spark plug, contact-breaker points, condenser, trouble shooting.

Cooling system: Types, principle of operation, parts of air/water cooling system, line diagram, radiator, thermostat, water pump, fan, engine heating, repair and maintenance, types of coolants.

Lubrication system: Types, principle of operation, components of lubrication systems, line diagram, types of lubricants, trouble shooting.

Electrical System: A.C. and D.C. voltage, alternator/dynamo, battery, battery charging and maintenance, self starter, electrical gauges and controls, line diagram, repair and maintenance.

Intake and exhaust system: Air intake system, air cleaner, supper charger, turbo charger, inter-cooling, and construction of intake and exhaust manifolds, mufflers, flue gases.

Practical :

1. Study of main components of engine and engine types.
2. Study of valve system and its adjustments.
3. Demonstration of fuel system, cooling system and electrical system of tractor.
4. Measurement of air pressure/air fuel ratio in each cylinder of engine.
5. Fuel injector, pump adjustment and calibration.
6. Demonstration of engine lubrication system.
7. Servicing of a single cylinder diesel engine.
8. Removal of air lock of a diesel engine.
9. Battery testing for charging/discharging.

10. Engine diagnostics-analysis of engine emissions using gas analyzer, multi-scan, etc.
11. Tour to tractor industry (Millat Tractors Limited, Al-Ghazi Tractors, LT)

❖ AEG 124 : Crop and animal infrastructure

➢ Crop and animal infrastructure: 5 credits (75 hours); L, T, P, SPW

Objective : Minimize infrastructural-based produce losses

1. Functional requirements of buildings for crops and animal
2. Design, engineering architecture
3. Farm estate planning, location of
4. Farm roads and drainage engineering, service areas, waste disposal passages

❖ AEG 125 : Farm Machinery & Earth Moving Equipment

➢ Farm Machinery & Earth Moving Equipment: 4 credits (60 hours); L, T, P, SPW

Objective : Teaching farm machines required for crop husbandry in addition to land leveling equipment.

Content :

Field Capacities and Cost Analysis: Implements Types, Factors affecting field capacity, Cost analysis

Hydraulics Controls and Power Take Off (PTO) Drives: Components of a hydraulic system, Types of hydraulic system, Limit control, Automatic position and Draft control, Hydrostatic Propulsion drives.

Tillage Force Analysis and Hitching: Forces acting upon a tillage implement, Mechanics of tillage, Tillage tool design factors, Measuring & evaluating performance, Measuring draft of implements, Vertical and horizontal hitching of trailed implement, Hitches for mounted implements, Depth and draft control on hitches.

Tillage Implements

(A). Primary Tillage Implements: Function & Types of Mold board plows, Components of a mold board plow, Reaction of soils to mold boards, Pulverizing action, Turning & inversion, Scouring, Forces acting upon a plow bottom, Effects of soil types, depth of plowing shape & design, attachments & rear furrow wheel and speed on draft & performance. Functions, components & types of Disk plows, Rotary plows, Chisel & subsurface plows.

(B). Secondary Tillage Implements: Functions, components & types of Harrows, Cultivators. Land rollers and Pulverizers, Subsurface tillage tools & field cultivators.

Equipment For Sowing And Planting: Functions, components & types of planting equipments, Seed metering devices, Maize drills, Calibration of seed drill. Broadcasting machines, Fertilizer and insecticide placement. Transplanting machines, Spraying systems.

Grain and Seed Harvesting: Harvesting and threshing methods, Types and development of Combines, functional elements of a combine, Flow path of material,

Types and sources of seed loss, Types of threshing cylinders, Threshing effectiveness, Cylinder adjustment, Testing of Combines and its power requirements, Windrowing.
Earth Moving Equipment: Principles and working of Bulldozers, Soil scrapers and ditchers, Crawler, Parts of Crawler, Comparison of wheel type and Crawler tractors.

Practical :

1. Identification of Primary Tillage Implements.
2. Identification of Secondary Tillage Implements.
3. Determination of Field Capacity of Agricultural Field Implements under actual field condition.
4. Determination of Field Efficiency of Agricultural Field Implements.
5. Determination of tractor Wheel Slip.
6. Calibration of grain drills in Laboratory.
7. Calibration of grain drills in Field.
8. Study and operation of Tractor Hydraulic System.

❖ AEG 126 : Agricultural Processing Engineering

➢ Agricultural Processing Engineering: 4 credits (60 hours); L, T, P, SPW

Objective : Developing an understanding of equipment and unit processes in agro-industries.
Content :

Introduction: industrial processes, value addition, structure and composition of food grains and fruits, engineering properties of agricultural materials - physical, mechanical and thermal properties.
Pumps: types of pumps used in the industries, pump selection, pump laws and performance, viscosity effects.
Fans: Classification as to type and design of fans, fan theory, fan performance, factors affecting fan selection, general performance and laws, fans in series and parallel, compression effect.
Material handling and transportation equipment: Belt conveyors, chain conveyors, bucket elevators, pneumatic conveyors, gravity conveyors, augers, and trailer/ trucks
Cleaning, Sorting and grading: Grade factors, washing types and methods of washing, sorting fruits and vegetables, types of sorters, cleaning and sorting, grading, nuts and seeds, types of grain cleaners/sorters, aerodynamics of small practical, types of separators, machine vision and its applications in grading.
Size reduction: Types of size reduction mills; fineness modulus, value of ground feed, size relationships, energy requirements, size reduction procedures, reducing devices, performance & characteristics of size reduction devices, mixing and types of mixers.
Cold Storages: Need of cold storages, types of cold storages and their design, temperature and humidity controls, heat load, automation of cold storages, air conditioning, aeration.
Drying: Drying and dehydration, moisture content determinations; primary methods, equilibrium moisture content, drying processes, constant rate period, falling rate period, falling rate drying mechanism, dynamics of equilibrium moisture content, effect of temperature upon the rate of drying, effect of air rate upon the rate of

drying, heat and mass balance limitation of the drying equipments, calculations, types of driers, psychometric chart.
Packaging Material: Packaging materials and techniques, material properties, packing geometries

Practical :

1. Determination of internal friction and angle of repose
2. Measurement of bulk density of grains
3. Measurement of grain moisture content by oven method and moisture meter.
4. Selection of fans for aeration of bin
5. Calculation of Fineness modulus of wheat flour
6. Demonstration of sieves used for cleaning/grading
7. Carrying out screen analysis of a milling/grinding equipment
8. Study of Psychometric chart to calculate heat transfer during aeration/drying.
9. Study of dehydration characteristics of fruits/vegetable by moisture content vs time curve and drying rate vs moisture content curve.
10. Visit to cold storage facilities.
11. Study tour to visit agricultural processing units and plants.

❖ AEG 127 : Civic and Ethical Education/Initiation to the Law

➢ Civic and Ethical Education: 3credits (45 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective'sgoods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Management and ethics of responsibility;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism

- Relationship between morality, law and ethics
- Codes of ethics

➢ **Initiation to the law :**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executive.

Content:

1. **Private Property**
2. **Reminder of the texts in force**
   - Study of the decree n°76/165 of 23 April 1976 laying down the conditions for obtaining the land title;
   - The study of the Order N°7V2 of 6 July 1974 laying down the regime federal lands;
   - The study of the Ordinance No. 77/1 of 10 January 1977 amending the Order no. 1 of 5 July 1974.
3. **The land title**
   - Definition;
   - Modality of obtaining the land title;
   - Transfer of real rights from the land title.
4. **Labour law**
   - The organization of the judiciary and national political institutions
   - Stories of trade unionism
   - The evolution of labor law
   - The collective agreements
   - The work contract (shape, suspension, rupture)
   - The remuneration and social charges
   - The laws - Security
   - Standard of occupational health and safety
   - Sub-contracts
   - Economic clauses and legal

❖ AEG 231 : Basic Mechanical Engineering

➢ **Basic Mechanical Engineering: 4credits (60 hours); L, T, P, SPW**

1. Introduction to Strength of Materials;
2. Stress-strain diagram;
3. Elastic constants and their relations,
4. Thermal stresses and strains, Stresses in oblique planes -Principal stresses and principal planes.

5. Theory of simple bending; Deflection of beams-integration method and moment area method.
6. Analysis of stresses in pressure vessels-thin and thick cylinders.
7. Torsion of solid and hollow circular Shafts.
8. Introduction to theory of Machines; Basic concepts: degrees of freedom, kinematic constrain, linkages, mechanisms.
9. Different types of gears, gear trains, reduction ratio and torque assessment, application of gearboxes.
10. Basic principles and constructions of governors, flywheels, brakes, clutches and dynamometers.

❖ AEG 232 : Statistics and Probability

➢ Statistics and Probability: 5 credits (75 hours); L, T, P, SPW

Objective: Students will learn relevant statistical tools and techniques to collect, analyse and present data
Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Statistical series of two variables and actual values**
   - Mathematical definition and presentation;
   - Covariance;
   - Graphical representation;
2. **Time series**
   - Definitions and Models;
   - Components;
   - Analysis and Forecasting.
3. **Basic elements of the theory of probabilities**
4. **Sampling and testing of hypotheses**
5. **Mastery statistical processes (MSP or SPC)**

❖ AEG 233 : Flesh Food Processing Machinery/Food Crop Processing Machines

➢ Flesh Food Processing Machinery/Food Crop Processing Machinery: 5 credits (75 hours); L, T, P, SPW

A. Flesh Food Processing Machinery

Objective: Acquire skills in animal and animal product processing

1. Engineering principles of food crop preservation and storage

2. Scientific foundations of unit operation in agricultural engineering processing,
3. Slaughter house machinery (non-ruminants/ruminants)
4. Meat/fish (fresh and processed) transportation engineering, storage
5. Flesh food marketing machinery, quality control

B. Food Crop Processing Machinery

Objective: Develop skills in raw material handling and processing systems

1. Engineering principles of food crop preservation an
2. Scientific foundations of unit operation in agricultural engineering processing system
3. Unit operations in the chain of processing systems
4. Crop drying, crushing, grinding, cracking, shelling, extraction, machines

❖ AEG 234 : Post Harvest Engineering

➢ Post Harvest Engineering: 5 credits (75 hours); L, T, P, SPW

Introduction: Importance of cereal grains and other food products, food preservation, the food cycle, important factors of food production.
Properties of Cereals: Cereal grains and their structure, physical properties, biochemical properties.
Factors Affecting Grain Stability: Physical factors, biological factors, chemical factors, thermal factors.
Post harvest Losses: Forms and measurement of post harvest losses, measures to control losses. Pre-storage handling of Food Products: Physiological maturity, harvesting, threshing, collection, transportation, and receiving system.
Drying and Aeration: principle of drying, solar drying, artificial drying, types of dryers, components of dryers, factors affecting drying rate, natural aeration, artificial aeration, methods of aeration, air conditioning/refrigeration.
Storage: Basic requirements for a storage structure, classification of storage structure, types of Public storage structures, storage structure design, temporary and permanent storage facilities, Non-conventional storage facilities, considerations in selecting type of storage structure, problems in grain storage, stored grain pests, control methods.
Grades and Standards: Importance of grades and standards, food quality, establishing grades and standards, assessing the grade, grade factors and their importance, grading equipment, representative sampling, WTO and its regulation regarding quality control.

Practicals:

1. Measurement of moisture content of grain, fibre, and other food products
2. Measurement of size, shape, density, specific gravity, porosity, angle of repose, coefficient of friction, hardness test.
3. Thermal properties of biological materials; specific heat, thermal conductivity.

4. Study of air conditioning and refrigeration plants.
5. Study of storage structures and their specifications.
6. Visits to public / private storage structures.

❖ AEG 235 : Soil & Water Conservation Engineering

➢ Soil & Water Conservation Engineering: 4 credits (60 hours); L, T, P, SPW

Objective: Understanding the process of soil degradation and its protection affectivity soil moisture and agriculture productivity.

Content:

Water Erosion: Erosion agents. Geologic and accelerated erosion. Damages caused by soil erosion. Water erosion and its types. Factors affecting water erosion. Sedimentation and pollution in relation to water erosion. Water erosion prediction equation. Erosion control practices.
Wind Erosion: Factors affecting wind erosion. Types of soil movement. Mechanics of wind erosion. Wind erosion control principles. Wind erosion prediction equation. Rainfall and Runoff:
Rainfall intensity and duration. Infiltration, Factors affecting runoff. Damages caused by floods. Water harvesting.
Cropping System and Agronomic Measures for Erosion Control: Watershed management, Plant cover, Crop rotation, Strip-cropping, Conservation tillage, Contour cultivation, Land capability classification.
Terracing: Field terrace. Classification of terraces. Broad base terraces. Bench terraces. Terrace design. Planning the terrace system. Terrace construction and maintenance.
Vegetated Outlets: Use of vegetated outlets and water courses in the control of erosion. Design of vegetated outlets. Water-way construction and maintenance.
Conservation Structures: Drops Spillways, Chutes and Pipes Spillways; their requirements, components and limitations.
Water Conservation: Definition of drought, Effects of drought. Water stored in soil. Decreasing runoff. Reducing evaporation. Reducing deep percolation. Preventing losses from storage.

Practical:

1. Measurements of soil loss from splash erosion by rainfall simulator.
2. Measurements of soil loss using universal soil loss equation.
3. Demonstration of moisture conservation techniques.
4. Field visit to areas with water and wind erosion prevailing.

❖ AEG 236 : Farm Machinery Management

➢ Farm Machinery Management : 4 credits (60 hours); L, T, P, SPW

Machine performance: Machines capacities; time efficiency; machine manoeuvrability; field patterns, factors effecting machine performance.
Power performance: Tractor power; draw bar power; PTO power, hydraulic power, power measurement; tractor tests, Nebraska Tractor Tests.
Ergonomics: Introduction, operator skill, operator aids for control, machine sensors, GPS role in machine control, operator safety and environment Machinery Management: Machinery costs – ownership costs, operating costs, and timeliness costs; machinery selection and replacement.
Optimization: optimum use of machine, estimation of power for a machine, part load operation, break even point, linear programming.
Hay and Forage harvesting: Mechanics of cutting plants; mowers; mover conditioners, balers; impact cutting; curing and preservation of forage; wind rowing.
Grain harvesting: Introduction, methods and equipment, reaper and windrowing; types of threshers, threshing cylinders, threshing losses, combine harvesting: types of cutting heads and tracks for different crops (wheat, rice, maize, sunflower), functional processes – gathering, cutting, pickup, feeding, threshing, separation, cleaning; combine losses and adjustments, performance evaluations.
Special crop machines: Cotton harvester; maize harvester; sugarcane harvester; potato harvester.
Precision Farming: Introduction, precision farming methods, precision equipment- laser land levelling, sensors, variable rate application, role of GIS and GPS in precision farming

Practical:

1. Measurement of Drawbar and PTO power of a tractor.
2. Calculation of field capacity of selected farm machinery.
3. Demonstration of reaper and thresher.
4. Demonstration of combine harvester.
5. Measurement of combine losses.
6. Measurement of maturity level of crop.
7. Thresher and Combine adjustments to solve grain breakage problem.
8. Study of cost analysis of combine harvesting.
9. Demonstration of laser land leveller and its adjustments.
10. Demonstration of GPS for precision farming.

❖ AEG 237 : Computer and multimedia / Information Communication Technology

➢ Computer and multimedia / Information Communication Technology : 3 credits (45 hours); L, T, P, SPW

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

A. Computer and Multimedia

1. Basic Definitions & Concepts
   - Hardware: Computer Systems & Components
   - Storage Devices, Number Systems
   - Software: Operating Systems, Programming and Application Software
   - Introduction to Programming, Databases and Information Systems
   - Networks
   - Data Communication
   - The Internet, Browsers and Search Engines
   - The Internet: Email, Collaborative Computing and Social Networking
   - The Internet: E-Commerce
   - IT Security and other issues
   - Project Week
   - Review Week
2. Introduction, historical background ;
3. Types of computers and application areas;
4. Impact of computers on society;
5. Current notions e.g., information society and globalisation;
6. Outline computer organisation (block structure of computers);
7. Explanatory definitions and examples of basic hardware, software and networking;
8. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services ; e-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
9. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
10. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

B. Information Communication Technology:

Objective: Apply ICT in design, development and implementation of agro-industrial mechanization

1. Computer capabilities in engineering
2. Engineering design/technical drawing methods/ land survey software
3. Machine operations and management
4. Machine repairs and trouble shooting
5. Unit operation/assembly line systems manufacture, standards and quality assurance

❖ AEG 241 : Engineering Economics & Management

➢ Engineering Economics & Management: 5 credits (75 hours); L, T, P, SPW

Management Fundamentals: Management, Administration, Leadership, Relationship Vs Task Management, Project and Program, Project Life Cycle, Trade Off. Line/Project Organization, Functional Organization, Matrix and Mixed Organization. Role and Responsibilities, Career Path, Special Demands on the Project Manager, Common Characteristics of a most effective Team, Selection of a Project Manager.

Project Scheduling And Control: Network Techniques, PERT, CPM & GRANT Charts, Use of Project management Softwares, Crashing of a Project, Physical Assets Control, Human Resource Control, Financial Control.

Marketing Management: Selling versus Marketing, Role of a company: Leader, Follower, Challenger, Basics of Marketing, Place, Price and Promotion. Role of a company in Market Place.

Quality Management: ISO 9000: International Quality Management, Quality Management in Pakistan, Fundamental Quality Concepts, Quality Terminology, Importance and Benefits of ISO-9000, Common Misunderstanding about ISO-9000, Classification of ISO-9000 Series, Brief Description of 20 Elements of ISO-9000, the Auditing Process.

Economics and Accounting: Budgeting Methods, Cost Estimation, Assets, Liabilities, Capital and Revenue Expenditure, Depreciation, Depletion, Amortization, Owner's Equity Debentures, Loan Financing, Accounting, Qaurds, Ledgers, Profit and loss statement.

❖ AEG 242 : Rural Sociology and extension of techniques

➢ Rural Sociology and extension of techniques: 4 credits (60 hours); L, T, P, SPW

Objective: Enabling to develop understanding regarding social issues, culture, system and knowledge / competency to design / analyses various relevant social aspect / data

Content:

Introduction: Field of Rural Sociology; Rural Sociology as a Science; Rural Sociology and Other Social Sciences. Basic Concepts and Processes: An understanding of the Rural Social System, Factions, dispute and "We-groups", Problems of small and fragmented holding, landless tenants and agricultural labor. Social stratification and social differentiation.

Basic Concepts and action: Group, Role and Status, Norms and Values, Folkways and Mores, Social Systems and Sub-systems: Culture. Socio Processes: Cooperation, Competition and Conflict; Acculturation, Accommodation and Assimilation. Social Institutions: Rural Social Institutions: Definition, Functions, Description and Analysis of the Social, Economic, Political and Religious Institutions. Social Change: Introduction, Factors in Acceptance and Resistance to Change, Role of Extension Worker as Change Agent. Main concepts development and problems in agrarian rural society.

Small scale farming. Feudalism. Capitalism. Family farming. Agrarian politics and village development. Relationship between technological and socio economic aspect of rural society. Gender and Development. Role and status of Rural Woman. Pattern of Rural Settlement, Rural Resources, Land Tenure System, size of landholdings. Rural Social structure, provision of services in rural area; health, education and sanitation etc. Questionnaire (types, development and analyses) and conflict resolution, crime as a social and cultural phenomenon, culture based crime, gender and development.

❖ AEG 243 : Maintenance of equipment

➢ Maintenance of equipment: 4 credits (60 hours); L, T, P, SPW

1. Computer capabilities in engineering
2. Engineering design/technical drawing methods/ land survey software
3. Machine operations and management
4. Machine repairs and trouble shooting Unit operation/assembly line systems manufacture, standards and quality assurance

❖ AEG 244 : Irrigation Water Management Techniques

➢ Irrigation Water Management Techniques: 4 credits (60 hours;L, T, P, SPW

Introduction: Concept of water management and its developments, components of water management. Water distribution: Irrigation system management, rotation system advantages and disadvantages.
Soil-water plant Relationship: Soil moisture and its types, soil moisture characteristics, field capacity, wilting point, total available water, management allowed deficit, infiltration rate, hydraulic conductivity.
Efficiencies: Definition, conveyance, application and storage efficiencies, irrigation efficiency, irrigation system efficiency. Land Leveling: Importance of land leveling in water management, topographic survey, system layout, determining cuts and fills, land leveling equipment, laser land leveling and use of total station. Discharge Measurement: Units of measurement, equipment and methods of measurement, interpretation of discharge data, water losses. Watercourse Design and Maintenance: Hydraulics of open channel flow, flow profiles, design of watercourse for a command, watercourse structures, cleaning and maintenance of watercourses. Watercourse Construction: Construction requirements and procedure, materials for construction, construction machinery, cost of watercourse lining and improvement. Lining of Watercourse: Materials of lining, lining techniques, cost estimate of lining

Practical:

1. Determination of field capacity and wilting points of a soil sample.
2. Land leveling of a given field and cost estimate.
3. Field visits of earthen and lined water courses.
4. Flow measurement in a watercourse and interpretation of data.

❖ AEG 245 : Hydraulic Machinery and water engineering

➢ Hydraulic Machinery and water engineering : 5 credits (75 hours); L, T, P, SPW

Objective: Ensure adequate water and power supply in various farms and agro-industries

Introduction: Definition, types and uses of hydraulic machinery.

Steady incompressible flow in pressure conduits: Laminar and turbulent flow in circular pipes, major and minor energy losses in pipes, branching pipes, pipes in series, pipes in parallel and pipe network analysis.

Similitude and dimensional analysis: Geometric, kinematic, and dynamic similarity, dimensionless numbers like Reynolds number, Froude number etc., and their application, application of similitude and dimensional analysis in hydraulic model studies.

Similarity laws and factors for turbo-machines: Efficiency, similarities, restriction on use of similarity laws, peripheral-velocity factor, specific speed.

Hydraulic turbines: Definition, types of turbines, suitability of turbines, components of turbines, inlet and outlet velocity diagrams, guide blade angle, inlet and outlet vane angles WHP and BHP of turbine, hydraulic, mechanical and overall efficiency of turbines, factors influencing the performance of turbines.

Functional analysis of various farm energy and water needs

Water supply engineering systems (bore holes, community owned, cooperation)

Power supply engineering (nation grid, solar, biogas, wind, other renewable

Applicability to various types of farms in various agro-ecological zones

Practical:

1. Impact of jet on stationary flat and curved vanes.
2. Measurement of various losses through pipes and pipe fittings.
3. Verification of Reynolds number.
4. Components and operational characteristics of various pumps.

❖ AEG 246 : Internship

➢ Internship : 6 credits (90 hours); P, SPW

1. Spend a minimum of 30 days on the job in any private or public establishment
2. Diagnose and identify practical bottleneck
3. Apply possible solution or suggest one
4. Write report according to prescribed HND format and defend in public

❖ AEG 247 : Computer and Multimedia / Initiation to the LAW

➢ Computer and Multimedia / Initiation to the LAW 3 credits (45 hours); L, T, P, SPW

A. Computer and Multimedia

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

Course Content:

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current notions e.g., information society and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services ; e-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
8. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
9. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

B. Initiation to the law

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executive

1. **Private Property**
2. **Reminder of the texts in force**
   - Study of the decree n°76/165 of 23 April 1976 laying down the conditions for obtaining the land title;
   - The study of the Order N°7V2 of 6 July 1974 laying down the regime federal lands;
   - The study of the Ordinance No. 77/1 of 10 January 1977 amending the Order no. 1 of 5 July 1974.
3. **The land title**
   - Definition;

- Modality of obtaining the land title;
- Transfer of real rights from the land title.

4. **Labour law**
   - The organization of the judiciary and national political institutions
   - Stories of trade unionism
   - The evolution of labor law
   - The collective agreements
   - The work contract (shape, suspension, rupture)
   - The remuneration and social charges
   - The laws - Security
   - Standard of occupational health and safety
   - Sub-contracts
   - Economic clauses and legal

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

FOOD TECHNOLOGY

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Food Technology

1. The objective of the training

Training students in food technology is done to help provide skilled labor capable of practically reducing both animal and plant foods at post production and prevent spoilage, to provide skilled labor to preserve and transform (add value) foods at all levels.

2. Skills sought after

→ **General skills**

- Mastery of basic ICT tools;
- Develop professional attitude in respect of deontology and ethics;
- Work as a team in training environment and in a practical environment;
- Understand the functioning of organizations;
- Work in a multicultural environment;
- Use data collection and processing techniques ;
- Implement research and job security actions;
- Creating and managing a business;
- Progressively developing an independent learning ability in order to be able to pursue one's personal and professional development throughout one's career.

→ **Specific skills**

- Post-harvest and production management of plant and animal foods
- Transformation of foods into other products
- Proper skills in hygiene practice during production (5GMP)
- Processing and transformation of cassava, cocoyam, yam sweet potatoes, etc, into flour chips and drinks.
- Transformation and preservation of different food types for long term preservation order to improve shelf life
- Operate some machines involve in milling, blending, grinding, pounding, mixing, cutting chopping as well as well as baking of foods

3. Career opportunities

- Assist in some processing industries, firms, brewery industries, sugar producing industries etc
- Technicians in bakery firms in Cameroon

- Food technologist
- Product development specialist
- Food safety inspector/auditor
- Food service officer
- Laboratory technician
- Public health sector

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Food technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOT111	Introduction to Food Technology	30	20	5	5	60	4
FOT112	Fruit and Vegetable Technology	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOT113	Human Nutrition / Biochemistry	30	15	10	5	60	4
FOT114	Principles of Standards and Quality Control	45	20	5	5	75	5
FOT115	Advanced food chemistry / Biological and Chemical Instrumentation	45	15	10	5	75	5
FOT116	Spices and Seasoning Technology	30	20	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOT117	Bilingual training	30	10	-	5	45	3
Total		**250**	**115**	**50**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Food technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOT121	Food Chemistry and Analysis	30	20	5	5	60	4
FOT122	Applied Food Science / Lifecycle Nutrition	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOT123	Milk and Dairy Technology	30	15	10	5	60	4
FOT124	Research Methodology	30	15	10	5	60	4
FOT125	Grains and Cereals Technology	45	25		5	75	5
FOT126	Meat and Poultry Technology	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOT127	Civics and Ethical Education/Initiation to the Law	30	10		5	45	3
Total		**205**	**95**	**120**	**30**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Food technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOT231	Handling of Raw Materials/Food Packaging, Presentation and Storage	25	15	15	5	60	4
FOT232	Food Legislation and Safety	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOT233	Food Engineering	20	5	15	5	45	3
FOT234	Technology of Plantation Crops (Cocoa, Coffee, Tea)	35	15	5	5	60	4
FOT235	Processing and Preservation of Roots and Tubers	45	25		5	75	5
FOT236	Internship in Food Technology 1			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOT237	Computer and Multimedia	30	10	-	5	45	3
Total		**250**	**115**	**50**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Food technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOT241	Food Product and Process Development	40	20	10	5	75	5
FOT242	Principles of Marketing	30	25		5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
FOT243	Water and Waste Management / Food Machines and Operation	20	15	20	5	60	4
FOT244	Industrial Microbiology	35	15	5	5	60	4
FOT245	Food Processing and Engineering	45	25		5	75	5
FOT246	Intership in food technology 2	45	20	5	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOT247	Information and communication in food technology	30	10		5	45	3
Total		**205**	**95**	**120**	**30**	**450**	**30**

5. Courses content

❖ FOT 111 : Introduction to Food Technology

➢ Introduction to Food Technology: 4 credits (60 hours); L, T, P, SPW

Course content

Introduction

1. Historical development of food science and technology
2. Evolution of Food Processing from prehistoric times till date.
3. Introduction to various branches of Food Science and Technology

UNIT 1: Compositional, Nutritional and Technological aspects of foods

1. **Cereals**
   - Introduction, structure, composition and uses and by-products of cereals and coarse cereals
   - Wheat- Structure and composition of wheat, types (hard, soft/ strong, weak)
   - Diagrammatic representation of longitudinal structure of wheat grain and process of malting, Gelatinization of starch, types of browning.
   - Rice- Composition of rice obtained by different dehusking methods, parboiling of rice- advantages and disadvantages.
2. **Pulses**
   - Introduction, common names and scientific names of different pulses.
   - Chemical composition of pulses,
   - Processing of pulses- soaking, germination, decortications, cooking and fermentation.
   - Toxic constituents in pulses and its detoxification processes.
3. **Fats and Oils**
   - Classification of lipids, types of fatty acids - saturated fatty acids, unsaturated fatty acids, essential fatty acids, trans fatty acids.
   - Refining of oils, types- steam refining, alkali refining, bleaching, steam deodorization, hydrogenation.
   - Rancidity - hydrolytic and oxidative rancidity and its prevention.
   - Define - margarine, butter, hydrogenated vegetable oil, lard.
4. **Fruits and Vegetables**
   - Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre.)
   - Post-harvest changes in fruits and vegetables– Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables.

PRACTICAL

1. Orientation to working in a food analysis lab.
2. Methods of sampling.
3. Study of different types of browning reactions.
4. Identification of pigments and concept of post-harvest changes in fruits and vegetables-climacteric, non-climacteric and senescence
5. Introduction to labeling of foods

❖ FOT 112 : Fruit and Vegetable Technology

➢ Introduction to Food Technology: 5 credits (75 hours); L, T, P, SPW

Objectives

1. To impart knowledge of different methods of fruits and vegetable processing.
2. To learn about processing of various spices, tea, coffee and cocoa.

Course content

1. **Introduction**
   - Importance of fruits and vegetable, history and need of preservation.
   - Reasons of spoilage,
   - Method of preservation (short & long term).
2. **Canning and bottling of fruits and vegetables:**
   - Selection of fruits and vegetables,
   - Process of canning,
   - Factors affecting the process- time and temperature,
   - Containers of packing,
   - Lacquering,
   - Syrups and brines for canning,
   - Spoilage in canned foods.
3. **Fruits beverages:**
   - Introduction,
   - Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification),
   - Preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation),
   - Processing of squashes, cordials, nectars, concentrates and powder.
4. **Jam, jellies and marmelades :**
   - Introduction
   - Jam: Constituents, selection of fruits, processing & technology
   - Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing& technology, defects in jelly
   - Marmalade: Types, processing & technology, defects.

5. **Pickles, chutneys and sauces:**
   - Processing
   - Types
   - Causes of spoilage in pickling.
6. **Tomato products:**
   - Selection of tomatoes,
   - Pulping& processing of tomato juice,
   - Tomato puree, paste, ketchup, sauce and soup.
7. **Dehydration of foods and vegetables**
   - Sun drying & mechanical dehydration
   - Process variation for fruits and vegetables
   - Packing and storage

PRACTICAL

1. Estimation of total soluble solids (TSS).
2. Estimation of pH and acidity of products.
3. Estimation of brix: acidity ratio
4. Estimation of ascorbic acid and effect of heat treatment on it.
5. To study the steps of can making process.
6. Dehydration of fruits and vegetables

❖ FOT 113 : Human Nutrition / Biochemistry

➢ Human Nutrition: 4 credits (60 hours); L, T, P, SPW

Objective: This course will enable the student to:

1. Understand the relationship between food, nutrition and health.
2. Understand the functions of food.
3. Learn about various food groups, balanced diet and principles of meal planning.
4. Understand digestion, absorption and function of various nutrients and their sources.

Course content

1. **Introduction to human Nutrition**
   - Basic terms used in study of food and nutrition 2
   - Understanding relationship between food, nutrition and health
2. **Balanced Diet**
   - Functions of food-physiological, psychological and social.
   - Concept of Balanced Diet, Food Groups, Food Pyramid, Food Exchange List
   - Principles of Meal Planning

3. **Nutrients**
    - Classification, digestion, absorption, functions, dietary sources, RDA, clinical manifestations of deficiency and excess of the following in brief:
    - Energy
    - Carbohydrates, lipids and proteins
    - Fat soluble vitamins-A, D, E and K
    - Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12and vitamin C
    - Minerals – calcium, iron, iodine, fluorine and zinc

➢ Biochemistry: 2 credits (30 hours); L, T, P, SPW

Objective: Students should understand the relevance of biochemistry and its application in plant and animal production and technology

Course content

1. Proteins, Amino Acids, And Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. The Enzymes
6. Introduction to Metabolism
7. Energy Transfer Process
8. Metabolism of Carbohydrates
9. Metabolism of Lipids
10. Metabolism of Nitrogen Compounds
11. Protein Synthesis and Gene Action
12. The Control of Metabolic Activities
13. Special Biochemistry of Higher Organisms

❖ FOT 114 : Principles of Standards and Quality Control

➢ Principles of Standards and Quality Control: 5 credits (75 hours); L, T, P, SPW

Objectives:

1. To learn about quality management in food production chain.
2. To learn about physical, chemical contaminants in foods
3. To understand the significance of safe processing of foods.

Course content

1. **Introduction to food quality control**
    - Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, factors affecting food behavior.
2. **Quality in the Agri-food production chain**

- Techno- managerial approach, food quality relationship and food quality management functions. Dynamics on the agri-food production chain, core developments in food quality management.

❖ FOT 115 : Advanced Food Chemistry / Biological and Chemical Instrumentation

➢ Advanced Food Chemistry: 4 credits (60 hours); L, T, P, SPW

Objectives

1. To understand the chemistry of foods - composition of food, role of each component and their interactions.
2. To understand the functional aspects of food components and highlight their role in food processing.

Course content

1. **Introduction to Food Chemistry**
   - Definition
   - Composition of food
2. **Water**
   - Definition of water in food
   - Structure of water and ice
   - Types of water
   - Interaction of water with solutes
   - Sorption phenomenon
   - Water activity and packaging
   - Water activity and spoilage
3. **Lipids**
   - Classification of lipids
   - Characteristics
   - Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point.
   - Chemical properties- iodine value, peroxide value, saponification value.
   - Effect of frying on fats
   - Changes in fats and oils- rancidity, lipolysis, flavor reversion
   - Auto-oxidation and its prevention
   - Technology of edible fats and oils- Refining, Hydrogenation and Inter esterification
4. **Proteins**
   - Protein classification and structure
   - Nature of food proteins (plant and animal proteins)
   - Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation,)

- Functional properties of proteins eg. organoleptic, solubility, viscosity, binding gelation / texturization, emulsification, foaming.

5. **Carbohydrates**
   - Classification (mono, oligo and poly saccharides)
   - Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums)
   - Chemical reactions of carbohydrates
   - Modified celluloses and starches
6. **Vitamins**
   - Structure, Importance and Stability
   - Water soluble vitamins
   - Fat soluble vitamins
7. **Flavour**
   - Definition and basic tastes
   - Chemical structure and taste
   - Description of food flavors
   - Flavor enhancers

PRACTICAL

1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Determination of gelatinization temperature range (GTR) of different starches and effect of additives on GTR.
4. Determination of percent free fatty acids
5. Estimation of saponification value
6. Estimation of reducing and non-reducing sugars.

- **Biological and Chemical Instrumentation: 1credit (15 hours); L, T, P, SPW**

❖ FOT 116 : Spices and Seasoning Technology

- **Spices and Seasoning Technology: 4 credits (60 hours); L, T, P, SPW**

Objective: To learn about processing of various spices,

Course content

1. Processing and properties of major and minor spices
2. Essential oils & oleoresins
3. Adulteration

PRACTICAL

1. Adulteration of spices.
2. Dehydration of Spices.

❖ FOT 117 : Bilingual Training

➢ Bilingual Training : 3 credits (45 hours); L, T, SPW

A. Basic English:

Objectives

1. To improve on the learners' English language skills (speaking, listening, reading, etc.)
2. To facilitate the learning and understanding of the other courses of which the medium of instruction is English
3. To enable the learners to interact in all social situations where English is used e.g. debates, workshops, panel discussions, etc.
4. To acquaint students with basic structure of English and grammatical functions
5. To formulate the learners' awareness of the historical and socio-cultural background of English in our society

Course content

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

B. French :

Course content:

1. **Vocabulaire**
   - Vocabulaire technique usuel
2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
- De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
- Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
- Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ FOT 121 : Food Chemistry and Analysis

➢ Food Chemistry and Analysis: 4 credits (60 hours); L, T, P, SPW

Objectives

1. To understand the chemistry of foods - composition of food, role of each component and their interactions.
2. To understand the functional aspects of food components and highlight their role in food processing.

Course content

1. **Introduction to Food Chemistry**
   - Definition
   - Composition of food
2. **Water**
   - Definition of water in food
   - Structure of water and ice

- Types of water
- Interaction of water with solutes
- Sorption phenomenon
- Water activity and packaging
- Water activity and spoilage

3. **Lipids**
   - Classification of lipids
   - Characteristics
   - Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point.
   - Chemical properties- iodine value, peroxide value, saponification value.
   - Effect of frying on fats
   - Changes in fats and oils- rancidity, lipolysis, flavor reversion
   - Auto-oxidation and its prevention
   - Technology of edible fats and oils- Refining, Hydrogenation and Inter esterification
4. **Proteins**
   - Protein classification and structure
   - Nature of food proteins (plant and animal proteins)
   - Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation,)
   - Functional properties of proteins eg. organoleptic, solubility, viscosity, binding gelation / texturization, emulsification, foaming.
5. **Carbohydrates**
   - Classification (mono, oligo and poly saccharides)
   - Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums)
   - Chemical reactions of carbohydrates
   - Modified celluloses and starches
6. **Vitamins**
   - Structure, Importance and Stability
   - Water soluble vitamins
   - Fat soluble vitamins
7. **Flavour**
   - Definition and basic tastes
   - Chemical structure and taste
   - Description of food flavors
   - Flavor enhancers

PRACTICAL

1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Determination of gelatinization temperature range (GTR) of different starches and effect of additives on GTR.

4. Determination of percent free fatty acids
5. Estimation of saponification value
6. Estimation of reducing and non-reducing sugars.

❖ FOT 122 : Applied Food Science / Life Cycle Nutrition

➢ Applied Food Science: 3 credits (45 hours); L, T, P, SPW

Objective: To impart basic knowledge of:

1. Food Dispersions
2. Sensory science
3. Food Science
4. Food Sanitation
5. Packaging Materials

Course content

1. **Food dispersions**
   - Characteristics, sols, gels, pectin gels, colloidal sols, stabilization of colloidal system, syneresis, emulsions, properties of emulsions, formation of emulsion, emulsifying agent, food foams, formation stability and destruction of foam, application of colloidal chemistry to food preparation.
2. **Sensory evaluation of food**
   - Objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo-trio test, triangle test, hedonic scale, chemical dimension of basic tastes, Amoore's classification of odorous compounds. Sherman and Sczezniak classification of food texture.
3. **Minimal processing**
   - Minimal processing of foods with thermal methods and non-thermal methods safety criteria in minimally processed foods-Minimal processing in practice fruits and vegetables-seafood-effect on quality-Future developments
4. **Water disposal and sanitation**
   - Waste water, hardness of water, break point chlorination, physical and chemical of impurities, BOD, COD, waste water treatment, milk plant sanitation, CIP system, sanitizers used in food industry.
5. **Packaging**
   - Objectives of packaging, flexible packaging, properties of the following packaging materials-low density polyethylene, high density polyethylene, polypropylene,polyvinyl chloride, polyvinylidene chloride, ethylene vinyl alcohol, polystyrene, polyethylene terephthalate, nylon,ethylene vinyl acetate, ethylene acrylic acid, ethylene methacrylic acid, ionomers.

PRACTICAL

1. Estimation of reducing sugar by Fehlings procedure
2. Preparation of brix solution and checking by hand refractometer
3. Estimation of protein content by Biuret titration
4. Demonstration of the Soxhlet method for determination of fat content
5. Determination of acidity of water
6. Determination of alkalinity/ hardness of water

- **Lifecycle Nutrition: 2 credits (30 hours); L, T, P, SPW**

Objective: The objective of this course is to stress on aspects as to enable the student have an insight on the nutritional requirements of the different groups of the population

Course content

1. **Introduction: Definition and Scope**
2. **Nutrient and health needs during pregnancy**
   - Maternal metabolic changes and adaptations
   - Macronutrient requirement during pregnancy
   - Micronutrient requirements during pregnancy
3. **Neonatal nutrition**
   - Human milk production and composition
   - Meeting the energy requirement (protein, carbohydrates, fat and fatty acids, micronutrients and fluid): the six-month exclusive breast feed period
   - Maternal/offspring benefits of breast feeding
4. **Nutritional requirements beyond six months of age**
   - Infant Feeding: Changes in nutrient requirement with age after birth, Complementary foods (infant formulae and weaning foods), Energy requirement for complementary foods
   - Childhood and Adolescence
5. **Nutrition of the elderly (geriatrics)**
   - The effects of ageing
   - Nutritional requirements of the elderly
6. **Convalescence**

❖ FOT 123 : Milk and Dairy Technology

- **Milk and Dairy Technology: 5 credits 75 hours); L, T, P, SPW**

Objectives

1. To know the need and importance of dairy and fishery industry
2. To know the compositional and technological aspects of milk and fish.
3. To study processed milk and fish products.

Course content

1. **Physical properties of milk color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity.**
2. **Lactose**
   - Lactose (alpha and beta forms and their differences)
   - Significances of lactose in dairy industry.
3. **Milk fat**
   - Composition and structure, factors affecting melting point, boiling point, solubility and Refractive Index, fat constants (saponification value, iodine value, RM value, Polenske value, peroxide value).
   - Chemical reactions of fat (hydrolysis, auto-oxidation), condition favoring autoxidation, prevention, measurement of auto-oxidation.
4. **Protein and Enzymes**
   - General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, fractionation of protein.
   - Enzymes- catalase, alkaline phosphatase, lipases and proteases.
5. **Market milk industry and milk products**
   - Systems of collection of milk
   - Reception, Platform testing
   - Various stages of processing
   - Filtration, Clarification
   - Homogenization
   - Pasteurization
6. **Description and working of clarifier, cream separator, homogenizer and plate heat exchanger.6 Lectures**
   - Flow diagram of following milk products – Butter, ghee, flavored milk, yoghurt, ice-cream, condensed milk, milk powder, cheese (cheddar).
   - Flow diagram of following milk products – Butter, ghee, flavored milk, yoghurt, ice-cream, condensed milk, milk powder, cheese (cheddar).

PRACTICAL

1. To perform platform tests in milk. (Acidity,COB,MBRT,specific gravity,SNF)
2. To estimate milk protein by Folin method.
3. Preparation of flavored milk/. Pasteurization of milk

❖ FOT 124 : Research Methodology

➢ **Research Methodology : 3 credits (45 hours); L, T, P, SPW**

❖ FOT 125 : Grains and Cereals Technology

➢ Grains and Cereals Technology: 5 credits (75 hours); L, T, P, SPW

Objectives

1. To teach technology of milling of various cereals
2. To impart technical knowhow of pulses and oilseeds refining

Course content

Introduction

Wheat --Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, technology of dough development.
Rice – Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by-products.
Corn – Milling (wet & dry), cornflakes
Barley- Milling (pearl barley, barley flakes & flour), beer preparation
Oats – Milling (oatmeal, oat flour & oat flake
Sorghum and millets – Traditional & commercial milling (dry &wet)
Rye and triticale—milling (flour), uses

PRACTICAL

1. Physical characteristics of wheat.
2. Moisture content of wheat and products.
3. Estimation of pelenske value.
4. Yeast fermenting power
5. Physical characteristics of rice.
6. Cooking quality of rice.

❖ FOT 126 : Meat and Poultry Technology

➢ Meat and Poultry Technology: 5 credits (75 hours); L, T, P, SPW

Objectives

1. To understand need and importance of livestock, egg and poultry industry
2. To study structure, composition and nutritional quality of animal products.
3. To study processing and preservation of animal foods.
4. To understand technology behind preparation of various animal food products and by-product utilization.

Course content

1. **Introduction**
   - Livestock and poultry population in India, Development of meat and poultry industry in India and its need in nation's economy, Glossary of live market terms for animals and birds.

2. **Meat quality**
   - Effects of feed, breed and environment on production of meat animals and their quality Meat Quality-color, flavor, texture, Water-Holding Capacity(WHC), Emulsification capacity of meat
3. **Slaughter process**
   - Slaughter, inspection and grading, Ante mortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig A GenericHACCP model, dressing of carcasses, post-mortem examination of meat
4. **Preservation of meat**
   - Refrigeration and freezing, thermal processing- canning of meat, retort pouch, dehydration, irradiation, and meat curing. Sausages-processing, types and defects
5. **By-products**
6. **Importance, classification and uses, Manufacture of Natural casings**

PRACTICAL

1. Estimation of moisture content of meat
2. Cutout analysis of canned meats/retort pouches
3. Estimation of protein content of meat
4. Analysis of frozen meat/meat emulsion products

❖ FOT 127 : Civic and Ethical Education/Initiation to the Law

➢ Civic and Ethical Education: 3credits (45 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective'sgoods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Management and ethics of responsibility;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism

- Relationship between morality, law and ethics
- Codes of ethics

➢ **Initiation to the law :**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executive.

Content:

1. **Private Property**
2. **Reminder of the texts in force**
   - Study of the decree n°76/165 of 23 April 1976 laying down the conditions for obtaining the land title;
   - The study of the Order N°7V2 of 6 July 1974 laying down the regime federal lands;
   - The study of the Ordinance No. 77/1 of 10 January 1977 amending the Order no. 1 of 5 July 1974.
3. **The land title**
   - Definition;
   - Modality of obtaining the land title;
   - Transfer of real rights from the land title.
4. **Labour law**
   - The organization of the judiciary and national political institutions
   - Stories of trade unionism
   - The evolution of labor law
   - The collective agreements
   - The work contract (shape, suspension, rupture)
   - The remuneration and social charges
   - The laws - Security
   - Standard of occupational health and safety
   - Sub-contracts
   - Economic clauses and legal

❖ FOT 231 : Handling of Raw Materials / Food Packaging, Presentation and Storage

➢ **Handling of Raw Materials: 2 credits (30 hours); L, T, P, SPW**

Objective: To impart basic knowledge of:

1. Cold Preservation and freezers
2. Dehydration
3. Irradiation

Course content

1. **Introduction**
   - Elementary concept of material handling in food industry, equipment and functioning of belt conveyor, screw conveyor, bucket elevator and pneumatic conveyor.
2. **Operations**
   - Definition, Types (Physical stages:Sorting and grading: Pre-washing: Peeling: Slicing: Washing: Others include;grinding, sieving, mixture, sedimentation, filtration, clarification, extraction, evaporation, drying, etc.), Chemical stages: refining, chemical peeling, Biochemical stages: fermentation, sterilization, pasteurization, enzymatic peeling
   - Postharvest techniques in handling raw material (Cold Preservation and freezers, Dehydration, Irradiation)

➢ Food Packaging, Presentation and Storage: 2 Credits (30 Hours); L, T, P, SPW

Objective: To impart basic knowledge of:

1. Food Packaging
2. Thermal Processing

Course content

1. Definition
2. Types of packaging materials,
3. Characteristics of packaging materials
4. The role or function of packaging
5. Shelf life of packaged food products

❖ FOT 232 : Food Legislation and Safety

➢ Food Legislation and Safety: 5 credits (75 hours); L, T, P, SPW

Objective: To understand the role of food standards and regulations in maintaining food quality.

Course content

1. **Introduction**
   - Cameroonian Food Regulatory Regime
   - Global Scenario
   - Other laws and standards related to food
2. **ISO series**
3. **Food Laws, standards and regulations**
   - History, National and International laws & Regulations:USFDA, EU,

- Codex alimantarius, World Trade Organization (Sanitary and Phyto Sanitary agreement, Technical Barriers in Trade), -Standards of Identity, Standards of Quality, Standards of fill of the container.

4. **TQM - concept and need for quality, components of TQM**

PRACTICAL

1. Qualitative tests for fats and oils, spices and condiments
2. Estimation of pesticide residues in food/water.
3. Estimation of benzoic acid in foods.

❖ FOT 233 : Food Engineering

➢ Food Engineering: 3 credits (45 hours); L, T, P, SPW

Objectives

1. To understand the principle of Unit operation
2. To acquaint with fundamentals of food engineering and its process
3. To understand the basics of designing of food plant and systems

Course content

1. **Introduction**
   - Concept of Unit operation,
   - Units and dimensions, Unit conversions, dimensional analysis
   - Mass and Energy Balance.
2. **Design of food plant**
   - Important considerations for designing of food plants
   - Construction and design
   - Types of layout
3. **Grinding and mixing**
   - Principle and equipment used in food industry
4. **Fluid Flow in food Processing**
   - Liquid Transport systems
   - Properties of Liquids
   - Newton's Law of Viscosity
   - Principle of capillary tube and rotational viscometer
   - Properties of Non-Newtonian fluids,
   - Flow characteristics, Reynolds Number, Bernoulli's Equation
   - Principles of Flow Measurement devices
5. **Refrigeration and Freezing**
   - Concept and selection of a refrigerant
   - Description of a Refrigeration cycle
   - Pressure Enthalpy charts and Tables
   - Mathematical expressions useful in analysis of vapor compression refrigeration cycle

- Numerical based on VCR system, Freon 12 and R-717, superheating and sub cooling
- Freezing time calculation using Plank's Equation
- Frozen food storage

6. **Heat and Mass Transfer**
   - Systems for heating and cooling food products
   - Thermal Properties of Food
   - Modes of heat transfer
   - Application of steady state heat transfer- estimation of conductive heat transfer coefficient, convective heat transfer coefficient, and overall heat transfer coefficient and, design of tubular heat exchanger.
   - Fick's Law of Diffusion
   - Mass transfer in packaging material
   - Membrane separation systems-Electrodialysis system, Reverse Osmosis, Membrane System, and Ultrafiltration Membrane System
   - Membrane devices used for RO and UF: Plate and Frame, Tubular, Spiral wound and hollow fiber devices.
7. **Psychometrics**
   - Properties of Dry Air
   - Properties of Water Vapor
   - Properties of air Vapor mixture
   - Psychometric Chart
8. **Steam, Evaporation and Dehydration**
   - Generation of steam
   - Construction and functions of fire tube and water tube boilers
   - Thermodynamics of Phase change
   - Steam tables
   - Boiling point elevation
   - Types of evaporations
   - Design of single effect evaporators
   - Basic Drying Process
   - Moisture content on wet basis and dry basis
   - Dehydration systems

PRACTICAL

1. Plant layout design
2. Determination of drying characteristics
3. Determination of viscosity of Newtonian and non-Newtonian fluids
4. Study of effect of temperature on viscosity
5. Boiling point elevation
6. Study of evaporation process
7. Determination of freezing characteristics
8. Psychometrics- use and application

❖ FOT 234 : Technology of Plantation Crops (Cocoa, Coffee, Tea)

- **Technology of Plantation Crops (Cocoa, Coffee, Tea):4 credits (60 hours); L, T, P, SPW**

Introduction

- Nutritional Properties/health benefits
- Processing (variety and products)

Cocoa: pure cocoa natural mass or paste, cocoa butter and powder, chocolate.

Coffee: coffee and coffee-based beverages

Tea: Types and processing techniques

❖ FOT 235 : Processing and Preservation of Roots and Tubers

- **Processing and Preservation of Roots and Tubers: 5 credits (75 hours); L, T, P, SPW**

❖ FOT 236 : Intership in Food Technology 1

- **Internship in Food Technology 1: 6 credits (90 hours); P, SPW**

Objective: This is a one to two month internship during which the trainees have the possibility to demonstrate the ability and skill to manage a small size food transformation unit; but trainees may also carry out this internship in a company, and will therefore be assigned specific tasks in the enterprise.

❖ FOT 237 : Computer for Business

- **Computer for Business : 3 credits (45 hours); L, T, P, SPW**

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

1. Basic Definitions & Concepts
    - Hardware: Computer Systems & Components
    - Storage Devices, Number Systems
    - Software: Operating Systems, Programming and Application Software
    - Introduction to Programming, Databases and Information Systems
    - Networks
    - Data Communication
    - The Internet, Browsers and Search Engines
    - The Internet: Email, Collaborative Computing and Social Networking
    - The Internet: E-Commerce

- IT Security and other issues
- Project Week
- Review Week

2. Introduction, historical background ;
3. Types of computers and application areas;
4. Impact of computers on society;
5. Current notions e.g., information society and globalisation;
6. Outline computer organisation (block structure of computers);
7. Explanatory definitions and examples of basic hardware, software and networking;
8. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services ; e-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
9. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
10. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

❖ FOT 241 : Food Product and Process Development

➢ Food Product and Process Development: 5 credits (75 hours); L, T, P, SPW

Objective : To introduce in systematic way the most common food engineering unit operations required to design food processes and the equipment needed to carry them out as well as the economic, sanitation and safety design aspects in food plant operations to successfully produce food products with maximum quality.

Course content

1. Designing the food engineering unit operations for online production, to product specificity
2. Critical awareness of the environmental aspects of designing unit operation for food production.
3. Identification for the needs for material and energy balance and needs to control and adapt the technological parameters for optimal unit operation in online production.
4. Identification of the equipment required in unit operations to product transformation specification and general plant operations.
5. Evaluation of the hygienic and safety aspects of unit operations during food processing.

❖ FOT 242 : Principles of Marketing

➢ Principles of Marketing: 4 credits (60 hours); L, T, P, SPW

Objective: At the end of this course, students should be able to:

- Understand the role of marketing in the economy;
- Predict consumer's wants or preferences;
- Anticipate and satisfy demand (needs) profitably in markets.

Course content

1. The environment of marketing
2. Approaches to analyse marketing problems
3. Market organisation
4. Supply and demand of agricultural products
5. Structure, conduct and performance of a market
6. Selling of agricultural products
7. General problems of agricultural commercialization

❖ FOT 243 : Water and waste management / Food machines and operation

➢ Water and Waste Management : 2 credits (30 hours); L, T, P, SPW

1. Evaluation of Data at the Station Level: Evaluation of Physical and Chemical characteristics of wastewater, Pathogenic and Biological Indicators, Assessment of Nutrient Impacts
2. Evaluating from Multiple Stations within an Assessment Unit
3. Designated Use Assessment Methods: Aquatic Life Use Assessment Method, Recreational Use Assessment Method, Fish Consumption Use Assessment Method, Shellfish Harvest For Consumption Use Assessment Method , Drinking Water Supply Use Assessment Method , Industrial Water Supply Use Assessment Method , Agricultural Water Supply Use Assessment Method
4. Delisting Assessment Unit/Pollutant Combinations
5. Method to Rank and Prioritize Assessment Units; Method for Developing the Monitoring and Assessment Plan
6. Wastewater management and associated hygienic risk: Conventional sanitation, Ecological sanitation, Sustainable Sanitation.
7. Resource management sanitation: Treatment systems for brown and black water, Treatment systems for grey water, Treatment systems for yellow water

➢ Food Machines and Operation : 2 credits (30 hours); L, T, P, SPW

❖ FOT 244 : Industrial Microbiology

➢ Industrial Microbiology : 4 credits (60 hours); L, T, P, SPW

Objectives

1. To know the important genera of microorganisms associated with food and their characteristics.
2. To understand the role of microbes in fermentation, spoilage and food borne diseases

Course content

1. **Introduction to Food Microbiology**
   - History and Development of Food Microbiology
   - Definition and Scope of food microbiology
   - Inter-relationship of microbiology with other sciences
2. **Characteristics of Microorganisms in Food**
   - Types of microorganisms, Classification and Nomenclature, Morphology and
   - Structure and their importance in food (bacteria, fungi, viruses and prions, protozoans and others)
   - Significance of spores
3. **Microbial Growth in Food**
   - Microbial Growth Characteristics- Bacterial growth curve, microbial reproduction and microbial growth in food
   - Factors affecting the growth of microorganisms in food
4. **Microbial Food Spoilage**
   - Sources of Microorganisms in foods
   - Some important food spoilage bacteria
   - Changes caused by micro-organisms during spoilage (breakdown of proteins,
   - carbohydrates, fats and other constituents)
   - Spoilage of specific food groups- Milk and dairy products, Meat, poultry and seafoods, Cereal and cereal products, Fruits and vegetables and Canned products
5. **Food Fermentations**
   - Fermentation –definition and types
   - Microorganisms used in food fermentations
   - Dairy Fermentations-starter cultures, types and methods of preservation and propagation, Lactic acid and aroma compounds production, Health benefits of LAB, probiotics, prebiotics and symbiotic
   - Fermented Foods-types, methods of manufacture for vinegar, soya yoghurt, beer, wine and traditional Cameroonian foods
6. **Foodborne Diseases**
   - Types – foodborne infections, foodborne intoxications and toxic infections

- Origin, symptoms and prevention of some commonly occurring foodborne diseases
- Emerging pathogens of concern

7. **Cultivation of Micro-organisms**
   - Pure culture technique
   - Methods of isolation and cultivation
   - Enumeration of Microorganisms- qualitative and quantitative
8. **Control of Microorganisms in Foods (6 Lectures)**
   - Principles and methods of preservation
   - Physical Methods of Food Preservation- Dehydration, Freezing, Cool Storage, Heat Treatment (esp. thermos bacteriology), Irradiation,
   - Chemical Preservatives
   - Bio preservatives esp. Bacteriocins
   - New Non-thermal methods
9. **Trends in Food Microbiology**
   - Rapid Methods of Detection
   - Recent Advances

PRACTICAL

1. Introduction to the Basic Microbiology Laboratory Practices and Equipment
2. Functioning and use of compound microscope
3. Cleaning and sterilization of glassware
4. Preparation and sterilization of nutrient broth
5. Cultivation and sub-culturing of microbes
6. Preparation of slant, stab and plates using nutrient agar
7. Morphological study of bacteria and fungi using permanent slides
8. Simple staining
9. Gram's staining
10. Negative staining
11. Standard Plate Count Method

❖ FOT 245 : Food Processing and Engineering

➢ Food Processing and Engineering: 5 credits (75 hours); L, T, P, SPW

Objective: To impart basic knowledge of:

1. Cold Preservation and freezers
2. Dehydration
3. Irradiation
4. Food Packaging
5. Thermal Processing

Course content

1. **Cold preservation**
   - Freezing: requirements of refrigerated storage - controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, progressive freezing, changes during freezing – concentration effect and ice crystal damage, freezer burn. Refrigeration load, factors determining freezing rate-food composition and non-compositional influences
2. **Freezing- Mechanism and freezers (6 Lectures)**
   - Freezing methods -direct and indirect, still air sharp freezer, blast freezer, fluidized freezer, plate freezer, spiral freezer and cryogenic freezing.
3. **Dehydration**
   - Normal drying curve, effect of food properties on dehydration, change in food during drying, drying methods and equipment air convection dryer, tray dryer, tunnel dryer, continuous belt dryer, fluidized bed dryer, dryer, drum dryer, vacuum dryer,freeze drying,foam mat drying.
4. **Food Irradiation and Microwave Heating**
   - Ionizing radiation and sources, unit of radiations, direct and indirect radiation effects, safety and wholesomeness of irradiated food. Microwave heating and application.
5. **Packaging of foods**
   - Packaging: Properties of packaging material, factors determining the packaging requirements of various foods and brief description of packaging of frozen products, dried products, fats and oils and thermally processed foods.
6. **Thermal processing**
   - Introduction, classification of Thermal Processes, Principles of thermal processing, Thermal resistance of microorganisms, Thermal Death Time, Lethality concept, characterization of heat penetration data, Thermal process Calculations
7. **Separation processes**
   - Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation

PRACTICAL

1. Preservation of food by the process of freezing
2. Osmotic dehydration
3. Minimal Processing
4. Drying of food using Tray dryer/other dryers

❖ FOT 246 : Internship in Food Technology 2

- **Internship in Food Technology : 6 credits (90 hours); P, SPW**

Objective: This is a one to two month internship in a food transformation enterprise. At the end of this period, the trainee should be able to analyse the functioning of the enterprise, come out with a problem faced by the enterprise and propose possible solutions to the problem.

❖ FOT 247 : Information and communication in food technology

- **Information and communication in food technology : 3 credits (90 hours); L, T, SPW**

Field : AGRICULTURAL AND FOOD

Specialty :

ANIMAL PRODUCTION TECHNOLOGY

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Animal Production Technology

1. The objective of the training

Training students in animal production technology aim to determine and define the breeds, strains and classes of various animals and their breeding management, they can also develop a good understanding of the health management of conventional and non –conventional animals in a professional, labour saving and cost effective selling.

2. Skills sought after

→ **General Skills**

- Mastery of basic ICT tools;
- Develop professional attitude in respect of deontology and ethics;
- Work as a team in training environment and in a practical environment;
- Understand the functioning of organizations;
- Work in a multicultural environment;
- Use data collection and processing techniques ;
- Implement research and job security actions;
- Creating and managing a business;
- Progressively developing an independent learning ability in order to be able to pursue one's personal and professional development throughout one's career.

→ **Specific Skills**

- Cultivation and or advice in breeding, management of the animals and its products;
- Analysis and consulting in the management of animal production
- Management and scheduling of the means of production;
- Mobilize basic knowledge in agronomy and zootechnics.
- Conduct of business or farming systems on territories and within socio-professional sector.
- Understand animal needs;
- Understand basic animal reproduction;
- Understand strengths and weaknesses of animal production;
- Understand bio–security threats in the agriculture industry;
- Identify causes of animal illnesses/diseases and parasites (especially Zoonosis).

3. Career opportunities

- Ministries related to animals and products;
- Animal production farms;
- Agro-industries (feed, processing, machinery);
- Self- employed in production and/ or processing.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Animal production technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT111	Physics and Chemistry	45	20	5	5	75	5
APT112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
APT113	Principles of animal production	30	15	10	5	60	4
APT 114	Pasture and Range Management	30	15	10	5	60	4
APT115	Animal Housing and Husbandry Techniques	45	15	10	5	75	5
APT116	Anatomy and Physiology of Farm Animals	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT117	Bilingual Training	30	10	0	5	45	3
Total		**255**	**110**	**50**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Animal production technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT121	Biochemistry and Microbiology	40	20	10	5	75	5
APT122	Statistics and Probability	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
APT123	Genetics and Breeding	30	15	10	5	60	4
APT124	Ruminant Animal Production	45	15	10	5	75	5
APT125	Applied Nutrition	45	15	10	5	75	5
APT126	Animal Reproduction and Physiology	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT127	Civic Education and Ethics/ Initiation to the Law	30	5	5	5	45	3
Total		**250**	**90**	**75**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Animal production technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT231	Genetics and selection	30	10	30	5	75	5
APT232	General Ledger	30	10	15	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
APT233	Non-ruminant animal production	30	10	30	5	75	5
APT234	Livestock Diseases and Health Care	30	10	30	5	75	5
APT 235	Principles of Aquaculture	30	10	15	5	60	4
APT236	Non-conventional Animal Production	30	10	15	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT237	Computing and multi-media	30	5	5	5	45	3
Total		**225**	**80**	**110**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Animal production technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT241	Markets and agricultural sectors	35	10	10	5	60	4
APT242	Rural Sociology and agricultural extension	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
APT243	Pisciculture	30	15	10	5	60	4
APT244	Conduct of other farms	40	5	10	5	60	4
APT245	Mechanization and equipment / livestock buildings	30	10	20	0	60	4
APT246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT247	Economy and Management of businesses	25	5	10	5	45	3
Total		**205**	**60**	**130**	**55**	**450**	**30**

5. Courses content

❖ APT 111 : Physics and Chemistry

Objective: to enable students explain the chemical constituents of food and their role in human metabolism.

➢ Physics and Chemistry: 5 credits (75 hours); L, T, P, SPW

1. **General physics**
   - Introduction to the classical physics;
   - Radiation interaction-matter-radiation; notions of Mechanics of the point, the strong and fluids; electricity and electromagnetism.
2. **Biophysics**
   - The concepts of thermodynamics, chemical and physical;
   - Acid-base properties of solutions;
   - Transmembrane Transport;
   - The interactions of radiation with matter;
   - The radiation: production, properties;
   - Biological effects of ionizing radiation; sound waves; Elements of optics.
3. **Mineral chemistry**
   - Fundamental Concepts: Reminder of the notions of atom, molecule and mole,
   - Electro negativity of the elements, types of connections, isometry, nomenclature;
   - Study Summary of elements of the block S; Study Summary of elements of the block P;
   - Summary Study of the transition elements.
4. **Organic chemistry**
   - Fundamental concepts;
   - Metal networks;
   - Ionic networks;
   - Molecular networks;
   - The main functions of the organic chemistry;
   - Alkanes, cyclo-alkanes, alkenes, alkynes, aromatic;
   - Halogen drifts;
   - Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.
5. **Marine Chemistry**
   - Description the physical and chemical properties of sea water. Composition of major elements and minors;
   - Chemistry to interfaces air/sea and water/sediment;
   - Redox reactions, redox potential;
   - Cycles of carbon, nitrogen and silicon in the ocean environment and estuarine environments;

❖ APT 112 : Mathematics

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

- **Mathematics: 4credits (60 hours); L, T, P, SPW**

1. Suites and actual series
2. Numerical Functions
3. Full calculation (primitives, surface integral and volume)
4. Differential Equation of the first and second-order
5. Use of computer tools for the resolution of equations and for the full calculation by the numerical methods
6. Vector space
7. Linear application

❖ APT 113 : Principles of animal production

- **Principles of animal production: 4 4credits (60 hours); L, T, P, SPW**

Objective: Appreciate historical and current advances in the development of animal production.

1. An Overview of animal production (domestication, roles, constraints, strategies)
2. Characterize ruminant animal production
3. Analyse non-ruminant production
4. Tropical production potentials and constraints with emphasis on Cameroon

❖ APT 114 : Pasture and Range Management

- **Pasture and Range Management: 4 4credits (60 hours); L, T, P, SPW**

Objective: Analyse grass eater feeding systems

1. Types of forage per agro-ecological zones of Cameroon (natural and introduced).
2. Land Range resources and management
3. Dry season feeding issues
4. Transhumance and pastures

❖ APT 115 : Elements of animal husbandry

➢ Elements of animal husbandry: 5 credits (75 hours); L, T, P, SPW

Objective: Examine appropriate confinement of animals systems

1. Farm animal houses/ environmental interactions requirements
2. Farm building materials, characteristics, costs, availability
3. Housing systems, equipment, utensils for ruminants
4. Housing systems and equipment for non-ruminants
5. Hatchery/ milking parlour/slaughter house management

❖ APT 116 : Anatomy and physiology of animals

➢ Anatomy and physiology of animals: 5 credits (75 hours); L, T, P, SPW

Objective: Describe the basic anatomical and physiological differences of animals

1. Physiological basis for growth and development
2. Digestive systems of farm animals
3. Reproductive system of farm animals
4. Nervous system

❖ APT 117 : Bilingual Training

➢ Bilingual Training : 3 credits (45 hours); L, T, SPW

A. Basic English:

Objectives

- To improve on the learners' English language skills (speaking, listening, reading, etc.)
- To facilitate the learning and understanding of the other courses of which the medium of instruction is English
- To enable the learners to interact in all social situations where English is used e.g. debates, workshops, panel discussions, etc.
- To acquaint students with basic structure of English and grammatical functions
- To formulate the learners' awareness of the historical and socio-cultural background of English in our society

Course content

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**

- Understanding in interaction in Technical Discussions
- Continuous oral communication: Show, explain, develop, summarize, account, comment;
- Interactions oral communication

4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ **Basic French :**

Course content:

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;

- Synthèse de texte
- De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
- Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
- Expressions figées

❖ APT 121 : Biochemistry and Microbiology

➢ Biochemistry : 2 credits (30 hours); L, T, P, SPW

Objectives: Students should understand the structure, function, properties and metabolism of bio molecules in plants and animals; the should understand the relevance of biochemistry and its application in plants and animal production and technology.

1. Introduction;
2. Structure of water;
3. Amino acids;
4. Basic Concepts of the biochemistry organic chemistry. Carbohydrates;
5. Notions of stereochemistry and isometry applied;
6. Concepts of natural polymers associated with these products. The lipids, amino acids, peptides and proteins;
7. The primary structure of proteins;
8. The purification of proteins;
9. The secondary structure of the protein;
10. The tertiary and quaternary structure of proteins;
11. The carbohydrates;
12. Concept of sequence of amino-acids;
13. Introduction to the Enzymology, with metabolic pathways and the phenomena of energy transfer.

➢ Microbiology : 3 credits (45 hours); L, T, P, SPW

Objective: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms for plants and domestic animals.

1. Introduction and general information;
2. General bacteriology;
3. General Virology;
4. General mycology;
5. General Parasitology;
6. Host parasites relationships;

❖ APT 122 : Statistics and Probabilities

Objective:
Students will learn relevant statistical tools and techniques to collect analyse and present data
Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

➢ Statistics and Probabilities : 4 credits (60 hours); L, T, SPW

1. **Descriptive statistics**
2. **Correlation and regression**
3. **Statistical series to a variable and actual values**
   - Mathematical definition and presentation;
   - Graphical representation;
   - Cumulative headcount;
   - Parameters of the central position (mean and median); dispersal parameters (variance, standard deviation).
4. **Analysis of the Variance**
5. **Probabilistic statistics**
6. **Law of probability**
7. **Random variables**
8. **Reliability**
9. **Statistical series of two variables and actual values**
   - Mathematical definition and presentation;
   - Covariance;
   - Graphical representation;
   - Linear regressions and non-linear; linear correlation.
10. **Inferential Statistics**
11. **The time series**
    - Definitions and Models;
    - Components;
    - Analysis and Forecasting; Arrangements; combinations.
12. **Basic elements of the theory of probabilities**
13. **Sampling and testing of hypotheses**
14. **Mastery statistical processes (MSP or SPC)**

❖ APT 123 : Genetics and Breeding

➢ Genetics and Breeding: 4 credits (60 hours); L, T, P, SPW

Objective: Develop skills in animal multiplication

1. Hereditary and Cell Division

2. Principle of Inheritance (Mendellian genetics)
3. Natural and artificial breeding
4. Genetically modified systems

❖ APT 124 : Ruminant Animal Production

➢ Ruminant Animal Production: 5 credits (75 hours); L, T, P, SPW

Objective: Meat/ milk production on farm

1. Breeding ofsheep, goats, beef/dairy cattle etc.
2. Management of ruminant animals
3. Feeding practice of ruminant animals
4. Disease and health care of ruminant animals

❖ APT 125 : Applied Nutrition

➢ Applied Nutrition : 5 credits (75 hours); L, T, P, SPW

Objective: Develop feeds and feeding systems

1. Chemistry and nutritive value of common concentrate feeds and forages
2. Classification of foods, feeding stuff and supplements
3. Nutrient requirements
4. Feed formulation (manuals/computerized)

❖ APT 126 : Animal reproduction and physiology

➢ Animal Reproduction and Physiology: 4 credits (60 hours); L, T, P, SPW

Objective: Examine cellular principles of reproduction

1. Female/male reproductive organs
2. Reproductive cycles/ Male female ratios
3. Reproductive wastes/ minimise principles in Cameroon
4. Natural and artificial insemination in Cameroon (gene banks)

❖ APT 127 : Civic and Ethical Education/Initiation to the Law

➢ Civic and Ethical Education: 3credits (45 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;

- The State;
- Publics Property unto collective'sgoods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Management and ethics of responsibility;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

➢ **Initiation to the law :**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executive.

Content:

1. **Private Property**
2. **Reminder of the texts in force**
   - Study of the decree n°76/165 of 23 April 1976 laying down the conditions for obtaining the land title;
   - The study of the Order N°7V2 of 6 July 1974 laying down the regime federal lands;
   - The study of the Ordinance No. 77/1 of 10 January 1977 amending the Order no. 1 of 5 July 1974.
3. **The land title**
   - Definition;
   - Modality of obtaining the land title;
   - Transfer of real rights from the land title.
4. **Labour law**
   - The organization of the judiciary and national political institutions
   - Stories of trade unionism
   - The evolution of labor law

- The collective agreements
- The work contract (shape, suspension, rupture)
- The remuneration and social charges
- The laws - Security
- Standard of occupational health and safety
- Sub-contracts
- Economic clauses and legal

❖ APT 231 : Genetics and selection

Objective: Develop skills in animal multiplication

➢ **Genetics and selection: 5 credits (75 hours); L, T, SPW**

❖ APT 231 : General Account

➢ **General Ledger : 4 credits (60 hours); L, T, SPW**

1. **The Company and its heritage**
   - Concept of Enterprise;
   - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
   - Concept of jobs resources; the Accounting transfer;
   - Of the accounts to the balance.
3. **The operations of purchases and sales**
   - Invoiring;
   - Accounting registration;
   - System of inventory;
   - Plug of stock.
4. **The regulations on term: the effects of trade**
5. **The depreciation and amortization**
   - Definition;
   - Accounting registration;
   - Typology.

❖ APT 233 : Non-ruminant Animal Production

Objective: the student should be equipped with knowledge, skills, and techniques of cattle production and management**.**

➢ **Non-ruminant Animal Production: 5 credits (75 hours); L, T, P, SPW**

Objective: Meat/poultry/egg production practices

1. Breeding of pigs, poultry (chickens, turkey, ducks, guinea fowl),
2. Management of non-ruminant animals
3. Feeding Principles of non-ruminant animals
4. Disease and Health Care of non-ruminant animals
5. Flesh food product quantities/quality, costs

❖ APT 234 : Livestock Diseases and Health Care

➢ Livestock Diseases and Health Care: 5 credits (75 hours); L, T, P, SPW

Objective: Disease prevention and cure in farm animals

1. Disease of farm animals
2. Preventions measures (hygiene, vaccination, quarantine)
3. Curative measures (diagnosis, medicines (over the counter, prescribed)
4. Ethno vet systems- medicinal plants
5. Zoonosis (bird flu, brucellosis etc.) health technician protocols/public safety

❖ APT 235 : Principles of Aquaculture

➢ Principles of Aquaculture : 4 credits (60 hours); L, T, P, SPW

Objective: Examine domesticated fish production

1. Fish culture techniques
2. Operating principles of hatchery
3. Fish feed formulation
4. Fish breeding and hybridization techniques

❖ APT 236 : Non-conventional Animal Production

➢ Non-conventional Animal Production: 4 credits (60hours); L, T, P, SPW)

❖ APT 237 : Computer and Multimedia

➢ Computer and Multimedia : 3 credits (45 hours); L, T, P, SPW

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

Content

1. Basic Definitions & Concepts
   - Hardware: Computer Systems & Components
   - Storage Devices, Number Systems
   - Software: Operating Systems, Programming and Application Software

- Introduction to Programming, Databases and Information Systems
- Networks
- Data Communication
- The Internet, Browsers and Search Engines
- The Internet: Email, Collaborative Computing and Social Networking
- The Internet: E-Commerce
- IT Security and other issues
- Project Week
- Review Week

2. Introduction, historical background ;
3. Types of computers and application areas;
4. Impact of computers on society;
5. Current notions e.g., information society and globalisation;
6. Outline computer organisation (block structure of computers);
7. Explanatory definitions and examples of basic hardware, software and networking;
8. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services; e-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
9. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
10. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

❖ APT 241 : Markets and agricultural sectors

➢ Markets and Sectors of agricultural products I: 4 credits (60 hours); L, T, P, SPW

Objectives

1. Foundations of agricultural policies;
2. Current agricultural policies: national approach and Africa;
3. Agricultural policies in Cameroon and in Africa in a global perspective

❖ APT 242 : Rural Sociology and agricultural extension

➢ Rural Sociology and agricultural extension: 5 credits (75 hours); L, T, P, SPW

Objective: At the end of this study, the student should be able to asses basic sociological concepts and principles applied to rural community roles, status and values: cultures, social organization and social problems in Cameroon. Enabling to

develop understanding regarding social issues, culture, system and knowledge / competency to design / analyses various relevant social aspect / data

Content:

Introduction: Field of Rural Sociology; Rural Sociology as a Science; Rural Sociology and Other Social Sciences. Basic Concepts and Processes: An understanding of the Rural Social System, Factions, dispute and "We-groups", Problems of small and fragmented holding, landless tenants and agricultural labor. Social stratification and social differentiation.
Basic Concepts and action: Group, Role and Status, Norms and Values, Folkways and Mores, Social Systems and Sub-systems: Culture. Socio Processes: Cooperation, Competition and Conflict; Acculturation, Accommodation and Assimilation. Social Institutions: Rural Social Institutions: Definition, Functions, Description and Analysis of the Social, Economic, Political and Religious Institutions. Social Change: Introduction, Factors in Acceptance and Resistance to Change, Role of Extension Worker as Change Agent. Main concepts development and problems in agrarian rural society. Small scale farming. Feudalism. Capitalism. Family farming. Agrarian politics and village development. Relationship between technological and socio economic aspect of rural society. Gender and Development. Role and status of Rural Woman. Pattern of Rural Settlement, Rural Resources, Land Tenure System, size of landholdings. Rural Social structure, provision of services in rural area; health, education and sanitation etc. Questionnaire (types, development and analyses) and conflict resolution, crime as a social and cultural phenomenon, culture based crime, gender and development.

❖ APT 243 : Apiculture

➢ Apiculture : 4 credits (60 hours); L, T, P, SPW

1. Beginning Beekeeping Basics
2. Beekeeping Income Sources.
3. Beekeeper.s Insurance
4. Organic Apiculture Standards
5. Africanized Hybrid Bees
6. Honey Bee Pests
7. Honey Bee Diseases

❖ APT 244 : Conduct of other farms

➢ Conduct of other farms: 4 credits (60 hours); L, T, P, SPW

❖ APT 245 : Mechanization and equipment / livestock building

➢ Mechanization and equipment: 2 credits (30 hours); L, T, P, SPW

Objective: At the end of this course, the student should be equipped with knowledge on farm machineries and the ability and skills on rational use of these machineries and equipment for an optimal crop and animal production.

The Constitution, the operation and the behavior of the equipment used in plant production
The tools of analysis and representation of technical systems of incorporation of agroéquipements;
Reading of the graphic representations (drawing parts, exploded views, views, skinned, standardized diagrams);
Use of the diagramming electrical and hydraulic;
Reading a kinematic chain;
Interpretation of the different pictograms, lights or indicators present on the hardware;
Constitution and operation of the engine and electrical: brief study;
Inventory and comparison of the different systems of air supply and
fuel present on the engines;

➢ Livestock building: 2 credits (30 hours); L, T, P, SPW

❖ APT 246 : Professional internship

Objective: The objective is to enable the student understand and be used to the rural environment in which he might work upon the completion of his training.

➢ Professional Internship:6 credits (90 hours); P, SPW

1. Arrival and Business Integration
2. Working in a company
3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ APT 247 : Economics and business management

➢ Economy and management of agricultural enterprises: 3 credits (45 hours); L, T, P, SPW

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

CROP PRODUCTION TECHNOLOGY

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Crop Production Technology

1. The objective of the training

Training students in crop production technology would be adequate prepared to take or make sound technical decisions, regarding the most suitable location for successful establishment and profitable production of the major crops.

2. Skills sought after

→ **General Skills**

- Maintain basic computer tools;
- Create and manage a business;
- Develop a learning autonomy;
- Understand how organizations work.

→ **Specific Skills**

- Understand principles of food and ornamental crop growth management
- Analyse and advice on the management of plant production;
- Manage and schedule the means of production;
- Conduct of business or production operating systems in territories and socio-professional sectors;
- Understand the production, technology and management of each of the main fruits crops of Cameroon;
- Establish ornamental farms
- Apply horticultural techniques to improve yield;
- Plan and execute ornamental gardens, parks, landscape gardens;
- Develop crop multiplication skills;
- Understand climate-crop Interactions;
- Appreciate the farm supply of grains;
- Able to establishment vegetable farms;
- Able to establishment ornamental farms.

3. Career opportunities

- Operations manager or culture within a company;
- Agricultural advicer (agricultural chamber, technical institute);
- Responsible for a supply unit (cooperative, chamber of agriculture);
- Technician breeder or experimenter in a research institute or a firm seed;
- Technician of seed multiplication;
- Technico commercial in the distribution of agricultural products;
- Commercial delegate an service in a company;
- Settle on his on.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Crop Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CPT111	Physics and Chemistry	45	15	10	5	75	5
CPT112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CPT113	Introduction to Crop Production and Horticulture Techniques	30	10	15	5	60	4
CPT114	Crop Physiology and Nutrition	30	10	15	5	60	4
CPT115	Crop Pests, Disease and Protection	45	15	10	5	75	5
CPT116	Soils and Fertilisation	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CPT117	Basic English and French	30	10	0	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Crop Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CPT121	Biochemistry and Microbiology	40	20	10	5	75	5
CPT122	Statistics and Probability	35	20	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CPT123	Crop Reproduction	30	15	10	5	60	4
CPT124	Agricultural Meteorology	45	15	10	5	75	4
CPT125	Plant Pathology and defense of cultures	45	15	25	5	90	5
CPT126	Markets and agricultural sectors	30	5	5	5	45	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CPT127	Civic Education and Ethics/Initiation to the Law	30	5	5	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Crop Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CPT231	Genetics and Plant physiology	40	20	10	5	75	5
CPT232	General Ledger	35	20	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CPT233	Roots and Tuber Production	30	15	10	5	60	4
CPT234	Cereal Production	45	15	10	5	75	4
CPT235	Fruit production Techniques	45	15	25	5	90	5
CPT236	Topography and rural construction	30	5	5	5	45	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CPT237	Economics and Businness Management	30	5	5	5	45	3
Total		**225**	**95**	**95**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Crop Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CPT241	Markets and agricultural sectors	35	10	10	5	60	4
CPT242	Rural Sociology and agricultural extension	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CPT243	Vegetable Production Techniques	30	15	10	5	60	4
CPT244	Spices/stimulant Cultivation Techniques	40	5	10	5	60	4
CPT245	Floriculture (Commercial Ornamental	30	10	20	0	60	4
CPT246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CPT247	Computing and multi-media	25	5	10	5	45	3
Total		**205**	**60**	**130**	**55**	**450**	**30**

5. Courses content

❖ CPT 111 : Physics and Chemistry

Objective:

- To understand the chemistry of foods - composition of food, role of each component and their interactions.
- To understand the functional aspects of food components and highlight their role in food processing.

➢ **Physics : 2 credits (30 hours); L, T, P, SPW**

1. **General physics**
   - Introduction to the classical physics;
   - Radiation interaction-matter-radiation; notions of Mechanics of the point, the strong and fluids; electricity and electromagnetism.
2. **Biophysics**
   - The concepts of thermodynamics, chemical and physical;
   - Acid-base properties of solutions;
   - Transmembrane Transport;
   - The interactions of radiation with matter;
   - The radiation: production, properties;

➢ **Chemistry: 3 credits (45 hours); L, T, P, SPW**

1. **Mineral chemistry**
   - Fundamental Concepts: Reminder of the notions of atom, molecule and mole,
   - Electro negativity of the elements, types of connections, isometry, nomenclature;
   - Study Summary of elements of the block S; Study Summary of elements of the block P;
   - Summary Study of the transition elements.
2. **Organic chemistry**
   - Fundamental concepts;
   - Metal networks;
   - Ionic networks;
   - Molecular networks;
   - The main functions of the organic chemistry;
   - Alkanes, cyclo-alkanes, alkenes, alkynes, aromatic;
   - Halogen drifts;
   - Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.

3. **Marine Chemistry**
    - Description the physical and chemical properties of sea water. Composition of major elements and minors;
    - Chemistry to interfaces air/sea and water/sediment;
    - Redox reactions, redox potential;

❖ CPT 112 : Mathematics

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

➢ Mathematics : 4 credits (60 hours); L, T, P, SPW

1. Suites and actual series
2. Numerical Functions
3. Full calculation (primitives, surface integral and volume)
4. Differential Equation of the first and second-order
5. Use of computer tools for the resolution of equations and for the full calculation by the numerical methods
6. Vector space

❖ CPT 113 : Introduction to Crop Production and Horticulture Techniques

➢ Introduction to Crop Production and Horticulture Techniques: 4 credits (60 hours); L, T, P, SPW

Objective: Understand principles of food and ornamental crop growth management

1. Crops of vital importance as staple and/or export
2. Plant reproduction /growth management
3. Pest, diseases and weed control
4. Principles of crop harvesting, processing and storage

❖ CPT 114 : Crop Physiology and Nutrition

➢ Crop Physiology and Nutrition: 4 credits (60 hours); L, T, P, SPW

Objective: Study plant cellular characteristics and nourishing systems

1. Cellular functions of the plant
2. Photosynthesis and respiration in plants
3. Plant nutrients, sources and Supply, costs
4. Plant growth and development

❖ CPT 115 : Crop Pests, Disease and Protection

Objective: At the end of this course, student will be able to make sound technical decisions regarding the most suitable location (site selection) for successful establishment and profitable production of the major crops of Cameroon

➢ Crop Pests, Disease and Protection: 5 credits (75 hours); L, T, P, SPW

Objective: Analyze undesirable components of crop production

1. Bacterial and insect pests;
2. Viral diseases
3. Preventive and curative methods
4. Weeds and principles of control

❖ CPT 116 : Soils and Fertilisation

➢ Soils and Fertilisation : 5 credits (75 hours); L, T, P, SPW

Objective: Document soil types and improvement strategies

1. Soils and characteristics
2. Matching soil type to crops/agro-ecological zone
3. Improvement methods (organic/inorganic)
4. Costs of improvements with emphasis in Cameroon

❖ CPT 117 : · Basic English and French

➢ Bilingual Training : 3 credits (45 hours); L, T, SPW

A. Basic English:

Objectives

- To improve on the learners' English language skills (speaking, listening, reading, etc.)
- To facilitate the learning and understanding of the other courses of which the medium of instruction is English
- To enable the learners to interact in all social situations where English is used e.g. debates, workshops, panel discussions, etc.
- To acquaint students with basic structure of English and grammatical functions
- To formulate the learners' awareness of the historical and socio-cultural background of English in our society

Course content

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

B. Basic French :

Course content:

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;

- Communication orale courante ;
- Communication orale interactive ;
- De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
- Lecture rapide et compréhension de texte ;
- Synthèse de texte
- De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
- Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
- Expressions figées

❖ CPT 121 : Biochemistry and Microbiology

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms for plants and domestic animals.

➢ Biochemistry: 3 credits (45 hours); L, T, P, SPW

1. Introduction;
2. water structure;
3. amino acids;
4. Basic Concepts of the biochemistry in association with those of the organic chemistry. Carbohydrates;
5. Notions of stereochemistry and isometry applied;
6. Concepts of natural polymers associated with these products. The lipids, amino acids, peptides and proteins;
7. Primary structure of proteins; purification of proteins;
8. Tertiary and quaternary structure of proteins; carbohydrates;
9. Concept of sequence of amino-acids;
10. Introduction to Enzymology, with metabolic pathways and the phenomena of energy transfer.

➢ Microbiology : 2 credits (30 hours); L, T, P, SPW

1. Introduction and general information;
2. General bacteriology;
3. General Virology;
4. General mycology;
5. General Parasitology;

❖ CPT 122 : Statistics and Probabilities

Objective:
Students will learn relevant statistical tools and techniques to collect analyse and present data

Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

➢ Statistics and Probabilities : 4 credits (60 hours); L, T, SPW

1. **Descriptive statistics**
2. **Correlation and regression**
3. **Statistical series to a variable and actual values**
   - Mathematical definition and presentation;
   - Graphical representation;
   - Cumulative headcount;
   - Parameters of the central position (mean and median); dispersal parameters (variance, standard deviation).
4. **Analysis of the Variance**
5. **Probabilistic statistics**
6. **Law of probability**
7. **Random variables**
8. **Reliability**
9. **Statistical series of two variables and actual values**
   - Mathematical definition and presentation;
   - Covariance;
   - Graphical representation;
   - Linear regressions and non-linear; linear correlation.
10. **Inferential Statistics**
11. **The time series**
    - Definitions and Models;
    - Components;
    - Analysis and Forecasting; Arrangements; combinations.
12. **Basic elements of the theory of probabilities**
13. **Sampling and testing of hypotheses**
14. **Mastery statistical processes (MSP or SPC)**

❖ CPT 123 : Crop Reproduction

➢ Crop Reproduction: 4 credits (60 hours); L, T, P, SPW

Objective : Develop crop multiplication skills

1. Sexual multiplication techniques

2. Asexual methods (tissue culture, budding, makotting, etc.)
3. Seed standards and quality control
4. Seed multiplication farms and structures, local and national systems
5. Gene banks, storage, costs

❖ CPT 124 : Agricultural Meteorology

➢ Agricultural Meteorology : 5 credits (75 hours); L, T, P, SPW

Objective: Understand climate/crop Interactions

1. Characteristics of weather and climate
2. Favourable climate crop effects
3. Unfavourable climate effects (drought, floods, winds, etc.)/prevention methods
4. Adaptation crop systems and methods to climate change locally/nationally

❖ CPT 125 : Plant Pathology and defense of cultures

Objective: Analyze undesirable components of crop production

➢ Plant Pathology and defense of cultures: 5 credits (75 hours); L, T, P, SPW

A. General Zoology

1. **Introduction**
2. **The anthropoid: general characters and classification The insects ;**
   - Morphology;
   - Classification (brief overview of the systematic);
   - Anatomy and Physiology (brief perceived);
   - Development;
   - Some aspects of the Ecology of insects.
3. **The nematodes**
4. **The mites**
5. **The other enemies, animals of Cultivated Plants**

B. General Phytopathology

1. **Parasitic Diseases**
2. **Physiological diseases**
3. **Cause of diseases: Parasitic Diseases Auto and hétérotrophie;**
   - Saprophytisme and parasitism; pathogens;
   - The cycle of a pathogenic agent:
     - Brief overview of the mode of action of a pathogenic agent;

- Morphology and biology of the pathogen (case of fungi, bacteria, virus, mycoplasma).

4. **The existence and use of the resistance of the plant to disease.**
5. **4. Influence of the Environment on the outbreak and the development of the disease diseases not parasitic diseases**
6. **diseases due to climatic factors nutritional diseases.**

C. Control Methods

1. **Introduction**
2. **The ecological struggle**
   - Principles;
   - Use of the rotations;
   - Choice of densities culturales, of planting dates;
   - Choice of manure;
   - Choice of cultivation ways; varietal choice.
3. **The fight clinical preventive struggle; curative control.**
4. **The biological fight**
5. **5. Integrated pest management**

Notes: In this course we will consider the fight against:

- Insects;
- The FUNGI, bacteria, virus;
- Nematodes;
- Seed Plants parasites; RODENTS BIRDS; weeds.

D. Special Entomology

❖ CPT 126 : Markets and agricultural sectors I

Objective

- The foundations of agricultural policies;
- Current agricultural policies: national approach and Africa;
- The agricultural policies in Cameroon and in Africa in a global perspective

➢ Markets and Sectors of agricultural products I : 5 credits (75 hours); L, T, P, SPW

1. Markets of agricultural productions: structures, developments
2. Vegetal productions on the local, national, African and global
3. Prospects of developments and issues
4. Topical issues and issues) the place and role of agricultural productions
5. Interest for the areas of production and use
6. Food security;
7. Strategies of the actors (States, large firms, producers);

8. Possible uses (power/energy/industry);
9. Research and innovations;

❖ CPT 127 : Civic and Ethical Education/Initiation to the Law

➢ Civic and Ethical Education: 3credits (45 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective'sgoods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Management and ethics of responsibility;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

➢ Initiation to the law :

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executive.

Content:

1. **Private Property**
2. **Reminder of the texts in force**
   - Study of the decree n°76/165 of 23 April 1976 laying down the conditions for obtaining the land title;
   - The study of the Order N°7V2 of 6 July 1974 laying down the regime federal lands;

- The study of the Ordinance No. 77/1 of 10 January 1977 amending the Order no. 1 of 5 July 1974.

3. **The land title**
   - Definition;
   - Modality of obtaining the land title;
   - Transfer of real rights from the land title.
4. **Labour law**
   - The organization of the judiciary and national political institutions
   - Stories of trade unionism
   - The evolution of labor law
   - The collective agreements
   - The work contract (shape, suspension, rupture)
   - The remuneration and social charges
   - The laws - Security
   - Standard of occupational health and safety
   - Sub-contracts
   - Economic clauses and legal

❖ CPT 231 : Genetics and plant physiology

Objective: Develop skills in crop multiplication

➢ Genetics and Plant physiology : 5 credits (75 hours); L, T, SPW

1. **Physiology of an angiosperm**
   - Characteristics of the nutrition of an angiosperm;
   - The growth and development of a angiosperm.
2. **Reproduction of a cultivated angiosperm**
   - The characteristics of the asexual reproduction; The characteristics of the sexual reproduction;
   - The process of formation of the seed and the fruit.
3. **Methods of Selection**
   - The genetic consequences of the meiosis and fertilization;
   - The origin and characteristics of the genetic variability;
   - The different methods of the creative selection; varieties resistant or tolerant to bio aggressors;
   - The different methods of the multiplication conservative.

❖ CPT 232 : General Ledger

➢ General Ledger : 4 credits (60 hours); L, T, SPW

1. **The Company and its heritage**
   - Notion of undertaking
   - Balance sheet and its variations.
2. **Analysis of the current operations of the company**

- Notion of jobs resourses
- Accounting transfer; Accounts to the balance.

3. **Operations of purchases and sales**
   - Invoicing;
   - Accounting registration;
   - system of iventory;
   - Plug of stock.
4. **Regulations on trade: the effects of trade**
5. **Accounting**

❖ CPT 233 : Roots and Tuber Production

➢ Roots and Tuber Production: 4 credits (60 hours); L, T, P, SPW

Objective: At the end of this course, students should be able to:

- Understand the role of marketing in the economy;
- Predict consumer's wants or preferences;
- Anticipate and satisfy demand (needs) profitably in markets

1. Agriculture off-ground grouping the cultures outside-soil: aéroponie, hydroponic, ultraponie and farms off-ground
2. Biotechnology
3. Selective culture of plants
4. The defense of cultures, phytosanitary products
5. Selective breeding of animals
6. Fertilization
7. Hydroponics
8. Irrigation
9. Agricultural Machinery

❖ CPT 234 : Vegetable Horticulture and Ornamental

Objective:

- Students should be able to establishment ornamental farms
- Apply horticultural techniques to improve yield
- Planning and execution of ornamental gardens, parks, landscape gardens

➢ Vegetable horticulture and ornamental: 4 credits (60 hours); L, T, P, SPW

Establishment of orchards and vegetable & ornamental gardens; site selection, layout methods, wind breaks. Management practices; irrigation, fertilizers & manures, training and pruning. Climate, soil, propagation, rootstocks, cultivars, important pests, harvesting, post-harvest handling and marketing of important horticultural crops (fruits, vegetables and ornamentals) of the region.

❖ CPT 235 : Fertility and fertilization

➢ Fertility and fertilization: 5 credits 75 hours); L, T, P, SPW

Objective: At the end of the course students should be able to determine the essential characteristics of a natural fertility; in case of poor or low soil fertility, they should be able to put in place agricultural techniques to boost the fertility of the soil.

Nutrient elements in plants, Criteria of essentiality and role of mineral nutrients in plants, Requirements and plant composition, Mechanism and factors affecting absorption and translocation of nutrients, Ion interactions, Nutrient concepts, Methods for evaluation of nutrients and their application, Deficiencies and toxicities, Growth yield and quality as affected by nutrient status.

Practical:

Relevant field and laboratory studies, surveys and assignments.

❖ CPT 236 : Topography and rural construction

➢ Topography and rural construction : 5 credits (75 hours); L, T, P, SPW

❖ CPT 237 : Economics and business management of agricultural enterprises

➢ Economics and business management of agricultural enterprises : 3 credits (45 hours); L, T, P, SPW

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps

17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

❖ CPT 241 : Markets and agricultural sectors II

Objectives:

- The foundations of agricultural policies;
- Current agricultural policies: national approach and Africa;
- The agricultural policies in Cameroon and in Africa in a global perspective

➢ Markets and Sectors of agricultural products II: 4 credits (60 hours); L, T, P, SPW

1. **Objectives and modes of intervention of public authorities**
   - foundations of agricultural policies;
   - Current agricultural policies: national approach and Africa;
   - The agricultural policies in Cameroon and in Africa in a global perspective.
2. **Operation of the chain of a agricultural production**
   - Marketing , circuit of marketing, agricultural policy, world market, commercial agreement, economic competition, formation of prices, production, agricultural product, food product, international trade, agri-food industries, transformation, great distribution, concentration, integration, professional organizations, added values, consumption.

❖ CPT 241 : Rural Sociology and agricultural extension

➢ Rural Sociology and agricultural extension: 5 credits (75 hours); L, T, P, SPW

Objective : At the end of this study, the student should be able to asses basic sociological concepts and principles applied to rural community roles, status and values: cultures, social organization and social problems in Cameroon

1. **Introduction**
   - Definition of the Rural animation;
   - Definition Of Community Development.
2. **Participation of the population**
   - Organization;
   - Methods of work with popular participation; participation and program; Role of the technician.
3. **Analysis at the position of the Agents**
   - Training of participants; training of local leaders;
   - Training and retraining of officers.

4. **Methodology of popularization**
   - Introduction;
   - Definition: popularization campaign;
   - The methods of analysis of the local situation;
   - Methods for the establishment of a program;
   - Methods of execution of a program;
   - Individual methods;
   - Methods of group;
   - Methods of mass;
   - Means of implementation of programs;
   - Methods of Evaluation;

❖ CPT 243 : Seed Systems

➢ Seed Systems: 4 credits (60 hours); L, T, P, SPW

Objective : To enable students' future farmers/entrepreneurs understand the basic principles of producing planting materials, the technologies involved, management and marketing

1. **Main issues of the sector plant seeds and the prospects for the evolution of the production of seed control of a system seed company**
   - Concept of "seed system" and its different components;
   - The principles and bases of the improvement of the plants;
   - Main features of the production of plant seed;
   - Analysis and establishment of a system of varietal creation;
   - Objectives of selection in a specific context; selection scheme adapted to a given situation; followed by a system of variety creation
2. **Analysis of a culture system including Seed Productions, from case studies**
   - Follow-up of a system of culture including seed productions;
   - Sustainability of a culture system including Seed Productions from indicators (agro-ecological, socio-territorial and economic) appropriate;
   - System of innovative culture in biological agriculture including seed productions;
   - The assessment process and the improvement of the quality in post culture (on the seed lots).

❖ CPT 244 : Perennial Crops

➢ Perennial Crops : 4 credits (60 hours); L, T, P, SPW

Objective: The student should be able to understand the production, technology and management of fibre, latex, and sugar crop of Cameroon. He or she should have the ability to produce each of them

1. **The different elements of the Societal demand**
   - Interest of the concept of a "system culture" in agronomy;
   - Estates of cultures on the evolution of states and of the properties of the middle and on the stands grown;
   - The agronomic characteristics of perennial crops.
2. **Fault finding on a system of culture within a farm**
   - Context of a system of culture and issues;
   - Characterization A culture system; description, location, identification of the determinants, links with the operating system, main results;
   - The conduct of the culture system and its main performance;
   - The sustainability of the system of culture with the help of indicators (agro-ecological, socio- territorial and economic) appropriate;
   - The strong points and the weak points of the system of Culture studied.
3. **Case Studies**
   - Spatial distribution of cultures within a system of farm or within a plot;
   - The technical interventions to the scale of the operation (organization of work, management of migrants or effluents)
   - Establishment of an innovative system;

❖ CPT 245 : Agricultural Mechanization

➢ Agricultural Mechanization : 4 credits (60 hours); L, T, P, SPW

Objective: At the end of this course, the student should be equipped with knowledge on farm machineries and the ability and skills on rational use of these machineries and equipment for an optimal crop and animal production.

1. **The Constitution, the operation and the behavior of the equipment used in plant production**
   - The tools of analysis and representation of technical systems of incorporation of agroéquipements;
   - Reading of the graphic representations (drawing parts, exploded views, views, skinned, standardized diagrams);
   - Use of the diagramming electrical and hydraulic;
   - Reading a kinematic chain;
   - Interpretation of the different pictograms, lights or indicators present on the hardware;
   - Constitution and operation of the engine and electrical: brief study;
   - Inventory and comparison of the different systems of air supply and fuel present on the engines.

❖ CPT 246 : Professional internship

Objective:

- Students field training in any farm establishment
- Students involvement in practical activities on farm
- Submit a report an end of training

➢ **Professional internship : 6 credits (90 hours); P, SPW**

1. Arrival and Business Integration
2. Working in a company
3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work

❖ CPT 247 : Computer and Multimedia

➢ **Computer and Multimedia : 3 credits (45 hours); L, T, P, SPW**

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

Content

1. **Basic Definitions & Concepts**
   - Hardware: Computer Systems & Components
   - Storage Devices, Number Systems
   - Software: Operating Systems, Programming and Application Software
   - Introduction to Programming, Databases and Information Systems
   - Networks
   - Data Communication
   - The Internet, Browsers and Search Engines
   - The Internet: Email, Collaborative Computing and Social Networking
   - The Internet: E-Commerce
   - IT Security and other issues
   - Project Week
   - Review Week
2. **Introduction, historical background ;**
3. **Types of computers and application areas;**
4. **Impact of computers on society;**
5. **Current notions e.g., information society and globalisation;**
6. **Outline computer organisation (block structure of computers);**
7. **Explanatory definitions and examples of basic hardware, software and networking;**
8. **Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer).**
9. **Information Services ;**
10. **E-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.**

11. **Office automation, introductory use of word processor, graphics and spread sheet packages, database access;**
12. **Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages**

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

FISHERIES MANAGEMENT

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Fisheries Management

1. The objective of the training

Training students in Fisheries Management serves to enhance animal protein sufficiency, provide varied of animal proteins and increase farmer incomes.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools
- To develop a professional attitude in the respect of ethics and deontology
- Work as a team in a training and a professional practice environment
- Understand the functioning of organizations
- Work in a multicultural environment
- Create and manage a business
- Use data collection and processing techniques
- Implement job search and securing actions
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career

→ **Specific Skills**

- Examine economic potentials and constraints of the industry;
- Describe the basic anatomy and physiology of fin and shell fish ;
- Describe the physical, chemical and biological environment of water bodies in general;
- Identify and describe aquatic flora and fauna species of economic interest;
- Describe fish nutrient requirements, and formulate balanced fish diets for different ages and species of fish;
- Develop skills and techniques to multiply fish;
- Travel and work at sea and other aquatic bodies safely;
- Aquire training in fish production in a recognised institution;
- Describe and practice techniques of fish production in captive facilities;
- Describe and practice process of collecting data;
- Master principles of aquaculture with specific examples in inland and marine environments;
- Develop skills in preventive and curative medicine;
- Identify, design and produce a number of equipment used in fishing and aquaculture.

3. Career opportunities

- Civil service (MINADER, MINEPIA, MINPMEESA, MINFOF,etc.)
- Non-Governmental Organizations (NGOs) and Programs
- Audit-consulting of farms and agropastoral enterprises
- Producer's organisations agent
- Decentralized territorial communities
- National Ministries related to fish production and marketing;
- Fishing industries;
- Teaching in schools;
- Settle on his own.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Fisheries Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FIM111	Biochemistry/Microbiology	45	20	5	5	75	5
FIM112	Mathematics	35	15	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
FIM113	Fish Anatomy and Physiology (Ichthyology)	40	15	15	5	75	5
FIM114	Fishery Industry	40	15	20	5	75	5
FIM115	Fish Nutrition and Technology I	35	15	5	5	60	4
FIM116	Fish habitat and gear	35	15	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FIM117	Bilingual Training	30	10		5	45	3
Total		**260**	**105**	**55**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Fisheries Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FIM121	Physics	30	25	-	5	60	4
FIM122	Elementary Seamanship, Safety and navigation	45	25	-	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FIM123	Fish Nutrition and Technology 2	30	20	5	5	60	4
FIM124	Fish Breeding/Nurseries	30	20	5	5	60	4
FIM125	Ornamental fishery and Aquarium design	30	20	5	5	60	4
FIM126	Agrostology			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FIM127	Civic and ethical education	30	10	-	5	45	3
Total		**195**	**120**	**75**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Fisheries Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FIM231	Statistics and probability	30	20	5	5	60	4
FIM232	Aquaculture In Cameroon	40	25	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FIM233	Fish farming	30	20	5	5	60	4
FIM234	Fisheries stock assessment and Rehabilitation	30	20	5	5	60	4
FIM235	Fish Processing Technology	30	10	15	5	60	4
FIM236	Fisheries Management	-	-	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FIM237	Information technology in fisheries management	30	10	-	5	45	3
Total		**190**	**105**	**95**	**60**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Fisheries Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FIM241	Chemistry	30	20	5	5	60	4
FIM242	Rural sociology and outreach marketing techniques	40	30	-	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FIM243	Fish diseases and healthcare	30	20	5	5	60	4
FIM244	Fisheries and aquaculture engineering	30	20	5	5	60	4
FIM245	Markets and sectors of fisheries products	30	20	5	5	60	4
FIM246	Internship Project			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FIM247	Initiation to the law	30	10	-	5	45	3
Total		**190**	**120**	**80**	**60**	**450**	**30**

5. Courses content

❖ FIM 111 : Biochemistry/ Microbiology

- **Biochemistry: 3 credits (45 hours); L, T, P, SPW**

Objectives

Students should understand the structure, function, properties and metabolism of bio molecules in plants and animals; the should understand the relevance of biochemistry and its application in plants and animal production and technology

1. Introduction;
2. Structure of water;
3. AminoFundamentals of biochemistry in association with those of organic chemistry carbohydrates.

- **Microbiology: 2 credits (60 hours); L, T, P, SPW**

Objectives : To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms for plants and domestic animals.

1. Introduction and generalities
2. General bacteriology;
3. General virology;
4. General mycology;
5. General parasitology;
6. Host parasites relationships
7. General immunology.

❖ FIM 112 : Mathematics

- **Mathematics: 4 credits (60 hours); L, T, P, SPW**

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

1. Importance of agricultural mathematics to students
2. Basic arithmetic
3. Use of measures on the farm
4. Weights and their use
5. Trigonometric calculations
6. Measurement conversions

❖ FIM 113 : Fish anatomy and physiology (ichthyology)

- **Fish anatomy and physiology (Ichthyology) : 5 credits (75 hours); L, T, P, SPW**

Objective: Describe the basic anatomy and physiology of fin and shell fish

1. Description of structure and function of both internal and external parts of fin fish
2. Fish systematic paying emphasis on the use of keys to identify and classify fish;
3. Use of meristic and morphometric characteristics;
4. Major fish groups.

❖ FIM 114 : Fishery industry

- **Fishery industry: 5 credits (75 hours); L, T, P, SPW**

Objective: Examine the economic potentials and constraints of the industry

1. Identification and classification of aquatic habitats;
2. Characteristic of freshwater habitats (physical, chemical and biological characteristics);
3. Fish ponds, inland and marine waters;
4. Study of tropical freshwater/sea flora (Phytoplankton types, zooplankton;
5. Toxicology in fish production systems;
6. Fishing gear for various types of fishing.

❖ FIM 115 : Fish nutrition and technology I

- **Fish nutrition and technology I: 4 credits (60 hours); L, T, P, SPW**

Objective: Describe fish nutrient requirements, and formulate balanced fish diets for different ages and species of fish:

1. Fish nutrient requirements and fish food;
2. Feed ingredients and their use;
3. Manual and computerized fish food formulation based on species and age requirements;
4. Methods of feeding fish;
5. Feed standards and quality control/costs/ legal framework.

❖ FIM 116 : Fish habitat and gear

- **Fish habitat and gear: 4 credits (60 hours); L, T, P, SPW**

Objective: Describe the physical, chemical and biological environment of water bodies in general and identify and describe aquatic flora and fauna species of economic interest

1. Ecosystem concepts;
2. Ecological inventory techniques.

❖ FIM 117: Bilingual Training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ FIM 121 : Physics

- **Physics: 4 credits (60 hours); L, T, P, SPW**

Objectives: By the end of the course students should be able to: travel and work at sea and other aquatic bodies safely

1. Describe the sea environment with emphasize to tides and waves;
2. Identify water vessels, their main parts and their respective horse power ranges;
3. Coast lights, light vessels and coast guard regulations;
4. Visibility and appearance at sea;
5. Swimming and Principles for Man Overboard Rescue;
6. Rules of the road and when Sailboats Meet;
7. Basic sailing techniques and terminology

❖ FIM 122 : Elementary Seamanship, Safety and Navigation

- **Elementary Seamanship, Safety and navigation: 5 credits (75 hours); L, T, P, SPW**

Objective: By the end of the course students should be able to: travel and work at sea and other aquatic bodies safely

1. Describe the sea environment with emphasize to tides and waves
2. Identify water vessels, their main parts and their respective horse power ranges
3. Coast lights, vessels light and coast guard regulations
4. Visibility and appearance at sea
5. Swimming and Principles for Man Overboard Rescue
6. Rules of the road and when Sailboats Meet
7. Basic sailing techniques and terminology.

❖ FIM123: Fish nutrition and Technology II

- **Fish Nutrition and Technology II : 4 credits (60 hours); L, T, P, SPW**

Objective : Describe fish nutrient requirements, and formulate balanced fish diets for different ages and species of fish.

1. Fish nutrient requirements and fish food;
2. Feed ingredients and their use;
3. Manual and computerizes fish food formulation based on species and age requirements;
4. Methods of feeding fish;
5. Feed standards and quality control/costs/ legal frame work.

❖ FIM 124 : Fish Breeding/Nurseries

- **Fish Breeding/nurseries: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop skills and techniques to multiply fish

1. Analyze fish genetics and breeding methods for various types and groups of fish;
2. Breeding fish in-situ/ex-situ;
3. Fish nurseries;
4. Fingerling farming;
5. Costs/marketing.

❖ FIM 125 : Ornamental fishery and aquarium design

- **Ornamental fishery and aquarium design: 5 credits (75 hours); L, T, P, SPW**

Objective : By the end of the course students should be able to: Identify and locate various ornamental aquarium fish species in Cameroon, know different types of aquaria; identify the accessories and know how they operate; Identify locally available materials for construction and their procurement; design, construct and maintain aquaria.

1. Importance of ornamental fishes and aquaria;
2. Species of ornamental fishes;
3. Types of aquaria and aquarium design;
4. Materials for aquarium construction;
5. Aquarium accessories and Functions of various accessories;
6. Ornamental plants and their types;
7. Filtration systems -Types of filtration systems in aquarium;
8. Aeration systems in aquarium;
9. Lighting system in aquarium;
10. Water quality: -Physical and chemical parameters of water;
11. Aquarium upholstery and stand.

❖ FIM 126 : Agrostology

➢ Agrostology : 5 credits (75 hours); L, T, P, SPW

Objective : By the end of the course students should be able to: work in a professional private or State owned aquaculture and/ or fisheries production facility or research institution.

1. Hands on training in an institution specialised crop production;
2. Appreciate some of the constraints of fish production on the field;
3. Visit to fish stations and to fisheries, aquaculture and oceanography research centers;
4. Visit selected delegations and chiefs of centre of MINEPIA to collect fishing and fish farming statistics;

❖ FIM 127 : Civic and Ethical Education / Initiation to the Law

➢ Civic and Ethical Education : 1 credit (15 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

➢ Introduction to law: 2 credits (30 hours); L, T, SPW

A. Land law

1. **Private property**

2. **Recall of legislative acts in force**
    - Study of decree No. 76/165 of 23 April 1976 laying down conditions for obtaining a land title;
    - Study of ordinance No. 7V2 of 6 July 1974 laying down the domanial regime;
    - Study of ordinance No. 77/1 of 10 January 1977 amending ordinance No. 1 of 5 July 1974.
3. **The Land title**
    - Definition;
    - Procedures for obtaining a land title;
    - Transfer of real rights from the title.

Labour and business law

A. Labour law

1. Judicial organization and national political institutions;
2. History of trade unions;
3. Evolution of labour law;
4. Collective agreements;
5. Employment contract (form, suspension, termination)
6. Remuneration and social security contributions
7. Legislation – security
8. Hygiene and security standards;
9. Subcontracting;
10. Economic and judicial provisions;
11. Staff representative (staff delegate, trade union delegates);
12. Social security;
13. Retirement.

B. Business law

1. **The key players of a commercial enterprise**
    - Access to the profession;
    - Consequences of the quality of the trader.
2. **The trader's goods**
    - The business capital;
    - The business lease;
    - Transfer of the business;
    - Pledging of a business.
3. **Regulated commercial contracts**
    - Commercial sale;
    - Intermediation contracts;
    - General obligations incumbent upon intermediaries.

C. Maritime law

1. **Concept of fishing zone**
    - Continental shelf;

- Exclusive economic zone, etc…

2. **Legal regime of a maritime and continental fishing zone**
3. **International fisheries organisation**
4. **Typology of international conflicts and mechanisms for peaceful conflict resolution**
5. **Law of the sea and maritime pollution regulation**
   - Pollution by ships;
   - Maritime accidents and environmental emergency;
   - Liability for damages;
   - Dangerous substances.
6. **Conservation of marine resources**
   - General regime and regional organisations.
7. **National regulation for the marine environment**

❖ FIM 231 : Statistics and Probability

➢ **Statistics and Probability : 4 credits (60 hours); L, T, P, SPW**

Objectives: Students will learn relevant statistical tools and techniques to collect analyse and present data. They should be gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis.

1. Introduction
2. Sources and methods of data collection
3. Methods for describing sets of data
4. Data analysis
5. Simple linear regression and correlation

❖ FIM 232 : Aquaculture in Cameroon

➢ **Aquaculture in Cameroon : 5 credits (75 hours); L, T, P, SPW**

Objectives : Master the principles of aquaculture with specific examples in inland and marine environments.

1. Definition of aquaculture and related terms (pisciculture, mariculture)
2. Sources of water for aquaculture (quantity and quality of water);
3. Aquaculture fish species;
4. Aquaculture systems;
5. Examples of Inland aquaculture;
6. Examples of Mariculture;
7. Aquaculture site selection;
8. Pond preparation and management (liming and fertilization);

9. Testing water quality (transparency, dissolved oxygen, aeration, pH, pollutants, weed control);
10. Routine activities (stocking, disease control).

❖ FIM233 : Fish farming

- **Fish farming: 4 credits (60 hours); L, T, P, SPW**

Objective : By the end of the course students should be able to: describe and practice the techniques of fish production in captive facilities.

1. Making a fish farm project plan survey and site selection
2. Different types of fish culture techniques, monoculture, polyculture, selected breeding;
3. Intensive and extensive culture, inland and brackish water in rice field, in floating cages and rafts;
4. Practical handling, stocking and care of fish;
5. Marine fish management systems.

❖ FIM 234 : Fisheries stock assessment and rehabilitation

- **Fisheries stock assessment and rehabilitation: 4 credits (60 hours); L, T, P, SPW**

Objectives: By the end of the course students should be able to: describe and practice the process of collecting data in order to enable fish stock exploration assessments, accountability and sustainable management of natural aquatic resources.

1. Definition of the term fish stock assessment and other related terms;
2. Productivity and fisheries;
3. Types of fish stock (coastal demersal fish stock, brackish water fish stock, fresh water fish stock;
4. Importance of fish stock assessment;
5. Types of models / approach used in conducting fish stock assessment;
6. Types of survey in fish stock assessment;
7. Dissemination of stock assessment results;
8. Restocking and rehabilitation of stocks from aquaculture.

❖ FIM 235 : Fish processing technology

- **Fish processing technology : 5 credits (75 hours); L, T, P, SPW**

❖ FIM 236 : Fisheries management

- **Fisheries management: 5 credits (75 hours); L, T, P, SPW**

Objective: Hands on training in fish production in a recognised institution

1. Hands on training in an institution specialised in crop production
2. Appreciate some of the constraints of fish production on the field
3. Visit to fish stations and to fisheries, aquaculture and oceanography research centers
4. Visit to selected delegations and chiefs of centre of MINEPIA to collect fishing and 5.fish farming statistics

❖ FIM 237 : Information technology in fisheries management

- **Information technology in fisheries management : 3 Credits (45 hours): L, T, SPW**

A. Computer for Business

Objective: At the end of the course, the trainee should be able to:

- Know related computing concepts ;
- Have practical hands on using computers.

Course content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current concepts e.g. information society and globalization;
5. Outline computer organization (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services; e-commerce, mention assorted internet related protocols and standards e.g. http, ftp, html.
8. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
9. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages.

B. Information technology in fisheries management

Objective : Computerization in crop production processes

1. Software/hardware principles application in breeding;
2. Application in growth/irrigation;
3. Management use.

❖ FIM 241 : Fish Economics

- **Fish Economics : 4 credits (60 hours); L, T, P, SPW**

Objective : Examine current and potential income generating processes

1. Fishing enterprise in Cameroon;
2. Stakeholders;
3. Job creation channels;
4. Gender issues;
5. Foreign exchange losses/ gains.

❖ FIM 242 : Rural Sociology and Outreach of Marketing Techniques

- **Rural sociology and outreach marketing techniques : 5 credits (75 hours); L, TP, SPW**

Objective : A t the end of this study, the student should be able to asses basic sociological concepts and principles applied to rural community roles, status and values: cultures, social organization and social problems in Cameroon.

1. Technique of rural animation;
2. Participation of the population;
3. Methodology of popularization;

❖ FIM 243 : Fish diseases and healthcare

- **Fish diseases and healthcare: 4 credits (60 hours); L, T, P, SPW**

Objective : Develop skills in preventive and curative medicine

1. Diseases of freshwater fish;
2. Diseases of marine fishes;
3. Pests of various fish;
4. Preventive measures;
5. Curative processes.

❖ FIM 244 : Fisheries and Aquaculture Engineering

- **Fisheries and aquaculture engineering : 4 credits (60 hours); L, T, P, SPW**

Objectives : By the end of the course students should be able to: identify, design and produce a number of equipment used in fishing and aquaculture

1. Planning the construction of a fish farm;
2. Pond site assessment and pond construction;
3. Fish farm equipment (types, design and construction);
4. Fishing gears (types, design and construction).

❖ FIM 245 : Markets and sectors of fisheries products

➢ Markets and sectors of fisheries products: 4 credits (60 hours); L, T, P, SPW

Objective: A t the end of this study, the student should be able to asses overview concepts of cost minimizing production, accounting practices.

1. Needs related to the demographic changes and economic development;
2. Interest for t areas of production and use (national scale African and global);
3. Food security;
4. Strategies of the actors (States, large firms, producers);
5. Possible uses (power/energy/industry);
6. Research and innovations;
7. Environmental issues;
8. Use of water;
9. Volatility and price formation;
10. Modes of production.

❖ FIM 246 : Internship Project

➢ Internship Project: 6 credits (90 hours); P, SPW

Objectives: By the end of the course students should be able to: work in a professional private or state owned aquaculture and/ or fisheries production facility or research institution.

1. Arrival and Business Integration
2. Working in a company
3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ FIM 247 : Economics and management of agri-businesses

- **Economics and management of agri-businesses: 3 credits (45 hours); L, T, SPW**

1. Main administrative, trade union and professional institutions
2. Functioning of local governments and development agencies
3. Business activities in the economic and social context
4. Elements of commercial and social law
5. Organisation methods
6. Analysis of needs and determination of a strategy
7. Creativity techniques
8. Economic environment and growth
9. Functional organisation of the enterprise
10. Business Accounting
11. Accounting agreements
12. Treasury operations
13. Management of human resources
14. Procurement, credit and third party management
15. Corporate communication
16. Administrative procedures
17. Elements of corporate taxation
18. Financial analysis and investments
19. Budget management

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AGROPASTORAL ADVICE

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Agropastoral Advice

1. The objective of the training

This specialty trains Agropastoral Advisers (APA) whose main mission is to backstop the recent government policies to favour on one hand (i) The development of second generation agriculture, (ii) the emergence of agropastoral farms of large and medium importance, (iii) the settlement of youths in the agropastoral sector, (iv) the development of different forms of farmers' organisations; notably cooperatives using the uniform OHADA Act, and on the other hand the passage from the logic of extension to that of advising, from the logic of supervising to that of backstopping.

The agropastoral adviser is thus required to provide technical and economic advice to territories and to individual or group organisations which he backstops in the strategic analysis, the identification, the elaboration and implementation of their projects.

2. Skills sought after

→ **General skills**

- Master the basic computer tools
- To develop a professional attitude in the respect of ethics and deontology
- Work as a team in a training and a professional practice environment
- Understand the functioning of organizations
- Work in a multicultural environment
- Create and manage a business
- Use data collection and processing techniques
- Implement job search and securing actions
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career

→ **Specific skills**

- Accompany the agropastoral producer to improve on the quality of his products
- Diagnose territories, agrarian systems and farmers organisations
- Inform, create awareness and mobilize actors in a territory
- Network actors
- Accompany project holders individually or collectively
- Provide technical and organizational advice to local development actors and rural organizations

- Provide technical expertise in one of the following fields: Crop Production, Animal Production, Fisheries Production, and Fishing.
- Take into account the political and socio-economic context of the country in his activity
- Mobilize in an advisory situation the knowledge and the techniques related to crop and animal production
- Put in place actions of animation, communication and administrative management.
- Provide support in the management and organization of agropastoral enterprises and farmers' organizations.
- Provide technico-economic advice in the running of production units

3. Career opportunities

- Civil service (MINADER, MINEPIA, MINPMEESA, MINFOF, etc.)
- Non-Governmental Organizations (NGOs) and Programs
- Audit-consulting of farms and agropastoral enterprises
- Producer's organisations agent
- Decentralized territorial communities

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Advice					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGA111	Physics / Chemistry	45	15	10	5	75	5
AGA112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AGA113	General economics	45	15	10	5	75	5
AGA114	Basic knowledge in animal sciences	45	15	10	5	75	5
AGA115	Basic knowledge in crop sciences	45	15	10	5	75	5
AGA116	Techniques of administrative management	30	10	0	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGA117	Bilingual Training	30	10	0	5	45	3
Total		**154**	**94**	**111**	**91**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Advice					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGA121	Statistics	30	25		5	60	4
AGA 122	Methods of Survey and data analysis	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGA123	Agropastoral dynamics and participatory diagnosis 1	45	15	10	5	75	5
AGA124	Management of Agropastoral Enterprises	30	20	5	5	60	4
AGA125	Legal and regulatory support to agropastoral enterprises and rural organisations	20	15	5	5	45	3
AGA126	Internship 1			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGA127	Civic & Ethical Education/ Initiation to the Law	30	10		5	45	3
Total		**92**	**68**	**100**	**190**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Advice					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGA231	Communication and animation techniques	15	15	30	15	75	5
AGA232	Community Development and Rural Organization	35	15	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AGA233	Crop production, processing and commercialisation techniques	30	15	15	5	60	4
AGA234	Animal production, processing and commercialisation techniques	30	15	15	5	60	4
AGA235	Agropastoral and rural development policies in Cameroon	45	15	10	5	75	5
AGA236	Agropastoral conflicts Management	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGA237	Computer for Business	30	10		5	45	3
Total		**115**	**70**	**100**	**165**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Advice					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGA241	Rural sociology	35	15	5	5	60	4
AGA242	Carry out agropastoralprojets	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGA243	Agropastoral dynamics and participatory diagnosis 2	35	15	5	5	60	4
AGA244	Halieutic and Fisheries productions, processing and commercialisation Techniques	35	15	5	5	60	4
AGA245	Agropastoral and rural development strategies in Cameroon	35	15	5	5	60	4
AGA246	Internship 2			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGA247	Initiation to job search and securing	30	10		5	45	3
Total		**115**	**60**	**125**	**150**	**450**	**30**

5. Courses content

❖ AGA 111: PHYSICS/ CHEMISTRY

➢ Physics: 2 credits (30 hours); L, T, P, SPW

Objective: To provide the trainees with basic principles of practical physics applicable in agricultural activities in particular and rural development in general.

Course content

1. Introduction
2. Mechanics and statics
3. The matter and its three states
4. Rural electricity

➢ Chemistry: 2 credits (30 hours); L, T, P, SPW

Objective: To introduce students to basic concepts, principles and properties involving the atom, the Periodic Table; the solid, liquid and gaseous states; acids and bases; chemical bonding and chemical changes that accompany chemical reactions.

Course content

The Atom; properties of the electron; the Bohr atom; energy levels in atoms; atomic orbitals; atomic structures and periodicity; bonding in molecules; molecular orbitals; hybridisation; shapes of molecules; chemical equation; the gas laws; explaining the gas laws; the structure of solids; acids; salts and bases; carbon and its compounds; chlorine and its compounds; compounds of nitrogen; sulphur; types of solids; liquid state; changes of state; properties of solutions; solubility; acids and bases; chemical equilibrium; equilibrium calculations.

❖ AGA 112 : Mathematics

➢ Mathematics: 3 credits (45 hours); L, T, P, SPW

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

Course content

1. **Importance of agricultural mathematics to students**
2. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
3. **Use of measures on the farm**
   - Linear measures
   - Square measure (area)

- Cubic measure (volume)
- Square roots

4. **Weights and their use**
5. **Trigonometric calculations**
6. **Measurement conversions**

❖ AGA 113 : GENERAL ECONOMICS

➢ General Economics: 5 credits (75 hours); L, T, P, SPW

Objective: To situate oneself within the mechanisms governing the economy and the development of rural areasand analyse a socioeconomic situation of a territory or sector

Coursecontent:

1. **Concept of development and rural development**
2. **Peculiarities of development in Africa and Cameroon, majors challenges of Cameroonian agriculture (crops, livestock and fisheries)**
   - Economic agents, economic channels, institutional sectors of the economy
   - Economic aggregates : GDP, GNP and national income
   - Factors of production
   - Markets and their regulation, marketing mechanisms, functions of the State and communities
3. **Peculiarities of tropical rural economy**
4. **Public policies and regulatory framework for agropastoral and rural development**
5. **Concept of sustainable development (economic, social and environmental)**
6. **Ranking of actors and their functions, modes of sectorial organisations**
7. **Measure the impacts of development programs**

❖ AGA 114 : Basic Knowledge in Animal Sciences

➢ Basic Knowledge in Animal Sciences : 5 credits (75 hours); L, T, P, SPW

Objective: Mobilize basic knowledge in zootechnics in the perspective of advising

Course content :

1. Animal description
2. Families of animals reared, concept of genus, species and breeds
3. Concept of growth and development
4. Nutrition, digestion and feeding of animals
5. Reproduction, lactation and rearing of young animals

6. Basic principles of selection and crossing of animals
7. Disease vectors, pathogenic agents and defensive mechanisms
8. Rules of hygiene and prophylaxis
9. Pasture management
10. Herd management

❖ AGA 115: BASIC KNOWLEDGE IN CROP SCIENCES

➢ Basic Knowledge in Crop Sciences: 5 credits (75 hours); L, T, P, SPW

Objective: Mobilize basic knowledge in agronomy in the perspective of advising

Course content:

1. Plant description
2. Plant multiplication
3. Plant families, concept of genus and species
4. Soil structure and texture
5. Soil maintenance (amendment, hydraulic and soil development)
6. Climatic factors that influence crop production and their measurements
7. Crop protection: principles and methods
8. Seeds and seeding
9. Analysis of the different operations of the technical itineraries (types, advantages, disadvantages)
10. Fertility/reasoning of organic and mineral fertilization, fallowing and rotations
11. Farm machineries: characteristics, choice and use

❖ AGA 116 : TECHNIQUES OF ADMINISTRATIVE MANAGEMENT

➢ Techniques of Administrative Management: 3 credits (45 hours); L, T, P, SPW

Objective: To plan activities and write administrative documents.

Course content:

1. Principles and methods of work organisation and distribution
2. Nature, characteristics and use of administrative documents: reports, feedback, minutes, administrative correspondences, briefing note, activities report
3. Rules of administrative correspondences
4. Techniques and tools of documents filing and archiving
5. Rules of writing

❖ AGA 117 : Bilingual Training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;

- Communication orale courante ;
- Communication orale interactive ;
- De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
- Lecture rapide et compréhension de texte ;
- Synthèse de texte
- De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
- Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
- Expressions figées

❖ AGA 121 : Statistics

➢ Statistics : 4 credits (60 hours); L, T, P, SPW

Objective:
Trainees will learn relevant statistical tools and techniques to collect, analyse and present data, gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

Course content

1. Introduction
2. Sources and methods of data collection
3. Methods for describing sets of data
4. Data analysis
5. Simple linear regression and correlation
6. The normal distribution

❖ AGA 122 : Methods of survey and data analysis

➢ Methods of Survey and Data Analysis: 5 credits (75 hours) ; L, T, P, SPW

Objective: Mobilize knowledge and the techniques on data collection and processing and to analyse qualitative data

Course content:

1. ICT : using of office software and analysis (Word, Excel, SPSS et Powerpoint, Microsoft project), search engines on the internet, management of electronic mails

2. Sources of information mobilised in the context of agropastoral adviser 's profession: human , geographical, economical and socio-professional environment, etc
3. Research methodology
4. Qualitative survey methods and choice criteria with respect to objectives: sampling, development of questionnaires (open ended questions, closed ended questions); preparation and carrying out semi structured interviews, stories..., sorting and treatment of data collected

❖ AGA 123 : Agropastoral dynamics and participatory diagnosis

- **Agropastoral Dynamics and Participatory Diagnosis: 5 credits (75 hours) ; L, T, P, SPW**

Objective: Put in place the methods and tool for territorial; diagnosisIdentify and understand the agrarian dynamics and their ongoing differentiation

Course content:

1. **Participatory diagnosis of a territory :**
   - Different types of diagnosis and their purposes
   - Methodology
   - Tools
2. **Agrarian diagnosis :**
   - Definition of concepts, stages and evolution
   - Study of the environment and the agro-ecological zoning
   - Study of the historical evolution of the modes of exploitation of the environment and the relation between production and the changes under way
   - Realisation of a dynamic typology of the agropastoral enterprises

❖ AGA 124: Management of agropastoral enterprises

- **Management of Agropastoral Enterprises : 4 credits (60 hours) ; L, T, P, SPW**

Objective: At the end of this course, trainees should be able to carry out farm activities, choose better alternatives and conceive long or short-term production planning.

Course content

1. Scope and nature of Farm Management
2. Decision making
3. Farm business organizations
4. Management tools and farm planning
5. Farm accounting systems
6. Farm evaluation
7. Farm accounting statement

❖ AGA 125: Legal and regulatory support to agropastoral enterprises and rural organisations

➢ Legal and Regulatory support to agropastoral enterprises and rural organisations : 3 credits (45 hours) ; L, T, P, SPW

Objective: Provide legal and regulatory support to agropastoral enterprises and rural organisations

Course content :

1. Different types of agropastoral enterprises and groups of agropastoral enterprises, and their modes of organisation
2. Legal and regulatory status of agropastoral enterprises and rural organisations (the concept of legalisation)

❖ AGA 126 : Internship 1

➢ Internship 1 : 6 credits (90 hours) ; P, SPW

Objective: The objective is to enable the trainee understand and be used to the rural environment in which he might work upon the completion of his training.

Course content

During the month of august, each trainee will carry out the study of one village of his choice and will produce at the end, a report including the following topics:

1. The history of the village
2. The physical features of the village (village landscape, pedology, climate, etc.)
3. Village agriculture and economy
4. Diagnosis of village problems and proposal of solutions

❖ AGA 127 : Civic and Ethical Education

➢ Civic and Ethical Education : 3 credits (45 hours) ; L, T,SPW

The concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;

- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ AGA 231 : Communication and Animation Techniques

- **Communication and Animation Techniques : 5 credits (75 hours) ; L, T, P ,SPW**

Objective: Use communication methods and techniques adapted to each situation; use animation techniques and methods adapted to each situation

Course content:

1. Techniques of communication : advantages and disadvantages, criteria of utilisation
2. Means of communication and messaging: nature (visual, oral, written) and choice with respect to envisaged usage
3. Production of messages on different tools (computer, papers)
4. Techniques of animation : characteristics, advantages and disadvantages
5. Animation tools
6. Types of meetings : information, training, negotiation, regulation, decision making
7. Functions, attitudes and tools of the animator, management of problems
8. Organisation and running: preparation, animation, closing, others...

❖ AGA 232 : Community development and rural organization

- **Community Development and Rural organization: 4 credits (60 hours) ; L, T, P, SPW**

Objective: Identify with actors local development initiatives; reason with actors the elaboration and implementation of local and community development plans

Course content:

1. Interviews comprehension
2. Collection of preoccupations
3. Concept of need and demand
4. Contributions on preoccupations, problem situations
5. Social position and point of view
6. Identification of problem and transformation into solvable problem
7. Steps of elaboration of a development plan
8. Problem prioritization
9. Coactive research of solutions
10. Taking into account financial aspects
11. Steps of implementation of a development plan
12. Actors involved and their functions
13. Planning and follow up tools, Indicators of follow up
14. Evaluation tools, evaluation indicators
15. Management organs:
    - Functions of actors;
    - Functioning mechanisms of the organs

❖ AGA 233 : Crop production, Processing and Commercialisation Techniques

- **Crop Production, Processing and Commercialisation Techniques:4 credits (60 hours) ; L, T, P ,SPW**

Objective:

- Analyse the pertinence of the technical itinerary of crop production taking into account the feasibility of the changes in the practices
- Reflect on the adaptations of a crop production system or a crop production workshop
- Realize crop production technical operations

Course content:

1. Productions systems : main types, characteristics, impact of the different systems on the environment
2. Reflecting on the crop production system at the level of agropastoral enterprise with respect to its objectives and characteristics (agro-climatic protection, factors of production, environmental sensitivity, availability of labour, market opportunities, SWOT analysis)
3. Criteria of characterisation of a system: survival threshold, work calendar, cash flow, opportunity cost...
4. Reflecting on the surface areas cultivated, work and agricultural calendar

5. Presentation and justification of the different elements of the technical itinerary: site selection, land preparation, planting/sowing, maintenance, harvesting, processing, conditioning, commercialisation
6. Presentation and justification of the different elements of the technical operations: site selection, treatment and valorisation of effluents, processing and conservation of products, commercialisation
7. Construction of an argument based on a participatory diagnosis of the advantages and disadvantages of different practices: conditions of implementation, regulation
8. Use of material
9. Realisation of work on the cultivated areas
10. Characteristics of the main crop production infrastructures and installations, land and hydraulics development
11. Reasoning on the set up and development of infrastructures, buildings and installations: technical comparison and cost, constraints of usage
12. Construction of an Argument
13. Characteristics of the main infrastructures and installations in animal production and hydraulic land development
14. Characteristics of livestock infrastructures, buildings, equipment and installations
15. Reasoning the putting in place and the development of infrastructures, buildings and installations: technical comparisons and costs, utilisation constraints
16. Construction of an Argument

❖ AGA234 : Animal Production, Processing and Commercialisation Techniques

- **Animal Production, Processing and Commercialisation Techniques: 4 credits (60 hours) ; L, T, P ,SPW**

Objective:

- Reflect on the adaptations of a livestock rearing system or animal production workshop
- Analyse the pertinence of the technical itinerary of animal production taking into account the feasibility of the changes in the practices
- Realize animal production technical operations

Course content:

1. Livestock rearing systems : main types, characteristics, impact of various system on the environment
2. Reflecting on the livestock rearing system at the level of a agropastoral enterprise with respect to its objectives and characteristics

3. Management of livestock rearing systems: survival threshold, work calendar, calendar of supplies, cash flow, and opportunity cost...
4. Reasoning of livestock rearing activities
5. Presentation and justification of the different elements of the technical itinerary: site selection, buildings, installation of animals, feeding of animals, hygiene, treatment and valorisation of wastes, processing and conservation of products, commercialisation
6. Construction of an argument based on a participatory diagnosis of the advantages and disadvantages of different practices: conditions of implementation, regulation
7. Use of material
8. Realisation of the main manipulations, restraint and interventions on livestock
9. Characteristics of infrastructures, buildings, equipments and installations used in animal rearing
10. Reasoning on the set up of infrastructures, buildings and installations
11. Reasoning on the set up and development of infrastructures, buildings and installations: technical comparison and cost, constraints of usage
12. Construction of an argument

❖ AGA 235 : Agropastoral and Rural development policies in Cameroon

- **Agropastoral and Rural development policies in Cameroon:5 credits (75 hours) ; L, T, P ,SPW**

Objective: To situate oneself on the law governing agropastoral activities, Interpretetexts (laws)

Course content:

1. Different levels of legislative and regulatory texts
2. Sources and procedures of application (who writes the texts, how)
3. Inventory of main laws and political strategies on the rural sector
4. Main texts of application
5. Techniques of researching laws applicable to a giving domain
6. Language level
7. Structure of different types of laws

❖ AGA 236 : Agropastoral Conflicts Management

- **Agropastoral Conflicts Management : 5 credits (75 hours) ; L, T, P ,SPW**

Objective: Identify the main causes of agropastoral conflicts; to contribute to the resolutions on land tenure related problems; Use conflictsresolution techniques

Course content:

1. **Main causes of agropastoral conflicts**
   - Delimitation of production zones (crops/ livestock)
   - Transhumance
   - Animals displacement paths
   - Extensive/intensive livestock rearing systems
2. **Main land actors and their functions**
3. **Laws and modalities governing access to land**
4. **Mode of enforcement**
5. **Legal procedures for land access**
6. **Land status and securing**
7. **Conflicts resolution techniques : conflict resolution procedures, the actors involved in conflicts management**

❖ AGA 237 : Computer Business

➢ Computer for Business:3 credits (45 hours) ; L, T ,SPW

Objective: At the end of the course, the trainee should be able to:

- Know related computing concepts ;
- Have practical hands on using computers.

Course content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current concepts e.g. information society and globalization;
5. Outline computer organization (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer).
8. Information Services;
9. E-commerce, mention assorted internet related protocols and standards e.g. http, ftp, html.
10. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
11. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages;

❖ AGA 241 : Rural Sociology

- **Rural Sociology : 4 credits (60 hours) ; L, T, P, SPW**

Objective: Identify the historical, geographical and social determinants of the country; use sociological knowledge of a rural community in view of better integration.

Course content:

1. Main thougths in sociology
2. Historical, geographical and social points of reference of Cameroon
3. Norms and customs in rural area
4. Socialisation process
5. Development in rural area

❖ AGA 242 : Carry out agropastoral projets

- **Carry out agropastoral projets : 5 credits (75 hours) ; L, T , P,SPW**

Objective: Create conditions for project emergence;Lead a project approach (from identification to evaluation)

Course content:

1. Maïeutic function : from the idea to the project
2. Concept of backstopping
3. Definition and role of a backstopper
4. project concept, logical process of a project, and the project cycle
5. types of projects with respect to their objectives
6. methodological approach of project elaboration (the logical framework)
7. planning tools
8. economic management and financial forecasting tools of a project
9. methods for project implementation and follow up
10. project evaluation tools

❖ AGA243: Agropastoral Dynamics and Participatory Diagnosis

- **Agropastoral Dynamics and Participatory diagnosis : 4 credits (60hours) ; L, T , P,SPW**

Objective: Characterize the functioning of agricultural and/or halieutic production systems

Course content:

1. Analysis of production system
2. Definition of concept, stages and evolution
3. Identification of system , characterisation and comparison of crop and livestock systems (GVA, land and labour productivity)

4. Analysis of the system of production as a combination of crop and livestock activities (labour calendar, cash flow)
5. Analysis of non agricultural activities
6. Economic evaluation of the systems and their sustainability (agricultural revenue, survival threshold, social reproduction threshold
7. Prospective analysis and comparison of results

❖ AGA 244 : Halieutic and Fisheries Productions, Processing and Commercialisation Techniques

- **Halieutic and Fisheries Productions, Processing and Commercialisation Techniques: 4 credits (60hours) ; L, T , P,SPW**

Objective:

- Reflect on the implementation of infrastructures, equipment and aquacultural installations
- Elaborate production technicalitinerary:reason a system or halieutic production workshop
- Argue the need for a change in practices

Course content:

1. Characteristics of different aquaculturalinfrastructures
2. Site selection
3. Topography tools
4. Reasoning on the development of fish ponds and facilities (stocking, reproduction ponds)
5. Choice and use of equipments, materials and installations
6. Maintenance of ponds and surroundings
7. Different aquacultural practices : advantages and disadvantages, conditions of implementation, influence of external factors
8. Presentation and justification of different steps of the technical itinerary:
   - Stocking of ponds with fingerlings
   - Monitoring of the environment and animals
   - Feeding
   - Carrying out reproduction
   - Animal care
   - Sorting, duplication, calibrating
   - Harvesting and conditioning
   - Storage
9. Characteristics of different aquacultural systems
10. Management of aquacultural system: survival threshold, work calendar, calendar supplies, cash flow, opportunity cost

11. Different processing and conservation practices : advantages and disadvantages, implementation conditions, regulation
12. Presentation and justification of different steps of the processing technical itinerary (depending on finished product)
13. Modes of commercialisation, marketing techniques, identification of market opportunities
14. Use of material
15. Carry out maintenance and development works
16. Carry out the main manipulations and interventions on halieutic production
17. Carry out processing works
18. Participatorydiagnosis of aquacultural production
19. Justification on the remedies or proposed solutions : measures of substitution, new practices, recommendations

❖ AGA 245 : Agropastoral and Rural Development Strategies in Cameroon

- **Agropastoral and Rural Development Strategies in Cameroon: 4 credits (60hours) ; L, T , P, SPW**

Objective: To contribute to the implementation of action plans

Course content :

1. Different phases of an action plan : genesis, elaboration, implementation, evaluation, planning
2. Main public policies in the field of agropastoral and rural development: education of the populations and professionals on sustainable development

❖ AGA 246 : Internship 2

- **Internship 2 : 6 credits (90hours) ; P, SPW**

Objective: The internship 2 is a one to two month internship in an organisation or in a community. At the end of this period, the trainee should be able to analyse the functioning of the community/organisation, come out with a problem faced by the enterprise and propose possible solutions to the problem.

Course content

1. Presentation of the community/organization
2. History of the community/organization
3. Administrative and technical organisation of the community/organization
4. Activities of the organization or group
5. Socio-economic analysis of the organization or group
6. Problems and solutions proposed
7. Individual and collective conflicts management

❖ AGA 247 : Initiation to job search and securing

➢ Initiation to job search and securing : 3 credits (45hours) ; L, T, SPW

Objective:

- Identify the structures in charge of managing employment
- Write the essential elements of employment application file
- To prepare for a job interview
- Secure one's job

Course content:

1. Employment managements structures and their functions (NEF, labour inspection, professional organizations, placement enterprises)
2. Job application
3. Curriculum vitae
4. Motivation letter
5. Recommendation letter
6. Types of job interviews:
   - Oral interviews
   - Writing test
   - Studies of files
7. Behaviors and attitudes to adopt
8. Basic principles of labour law and the main provisions concerning working conditions
9. Social protection conditions
10. Labour contract
11. Obligations of the employer and the employee
12. Individual and collective conflicts management

Necessary didactic equipment

Board, chalk, bold marker, video projector, laptop, text books for guidance, farm for demonstration, computer for demonstration, Internet browsing …

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AGROPASTORAL ENTREPRENEURSHIP

Field:	AGRICULTURAL AND FOOD SCIENCES

Specialty:	Agropastoral Entrepreneurship (AGE)

1. The objective of the training

This specialty trains Agropastoral Entrepreneurs whose mains missions are: personnel management and work organisation, conduct of sustainable crop and livestock production systems and enterprise management.

2. Skills sought after

→ **General skills**

- Work as a team in a training and in a professional practice environment
- Understand the functioning of organizations
- Work in a multicultural environment
- Create and manage a business
- Use data collection and processing techniques
- Implement job search and securing actions
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career
- Use in professional setting knowledge and techniques related to communication and treatment of information

→ **Specific skills**

- Locate an operating system in its natural environment
- Develop the exploitation strategy in a perspective of sustainability
- Run a production system in a perspective of sustainability
- Realize the technico-economic and financial management of an agropastoral enterprise
- Manage the work on an agropastoral enterprise in compliance with the regulations
- Reasoning the marketing of agropastoral enterprise products in order to maximize income
- Ensure the conservation and conditioning of harvested products in order to limit losses
- Ensure the processing of the products of an agropastoral enterprise
- Support the creation and management initiatives of agropastoral enterprises
- Mobilize basic knowledge in agronomy and zootechnic
- Locate a agropastoral enterprise within its social and economic environment

3. Career opportunities

- Promoter / owner of a family farm enterprise
- Manager/employee of agropastoral SMEs
- Non-Governmental Organizations (NGOs) and Programs
- Audit-consulting of agropastoral enterprises
- Civil service (MINADER, MINEPIA, MINPMEESA, MINFOF, etc.)

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Entrepreneurship					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGE111	Physics / Chemistry	45	15	10	5	75	5
AGE112	Mathematics	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AGE113	Elements of the functioning of living organisms and human health	45	15	10	5	75	5
AGE114	Agronomic sciences and techniques	45	15	10	5	75	5
AGE115	Zootechnical sciences and techniques	45	15	10	5	75	5
AGE116	Halieutic and fisheries production, processing and commercialisation techniques	20	10	10	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGE117	Bilingual Training	30	10		5	45	3
Total		**260**	**95**	**60**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Entrepreneurship					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGE121	Socioeconomic and regulatory environment of an agropastoral enterprise	35	15	5	5	60	4
AGE122	Communication, data treatment and analysis	45	20	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGE123	Run a livestock production system	35	15	5	5	60	4
AGE124	Run a crop production system	35	15	5	5	60	4
AGE125	Agropastoral Activities and Environmental Issues	35	15	5	5	60	4
AGE126	Internship 1			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGE127	Civic& Ethical Education	30	10	-	5	45	3
Total		**215**	**90**	**85**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Entrepreneurship					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGE231	Agricultural mechanization and agro-equipment 1	45	15	10	5	75	5
AGE232	Business Law	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AGE233	Agricultural mechanization and agro-equipment 2	30	20	5	5	60	4
AGE234	Commercialisation of agropastoral products	45	15	10	5	75	5
AGE235	Piloting an agropastoral enterprise 1	30	20	5	5	60	4
AGE236	Land acquisition	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGE237	Computer for Business	30	10	-	5	45	3
Total		**255**	**115**	**45**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agropastoral Entrepreneurship					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGE241	Standard Principles and Quality Control	30	20	5	5	60	4
AGE242	Human resource management	25	10	20	20	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGE243	Economic and Financial management of an agropastoral enterprise	30	20	5	5	60	4
AGE244	Food Processing & Preservation	30	20	5	5	60	4
AGE245	Piloting an agropastoral enterprise 2	30	20	5	5	60	4
AGE246	Internship 2			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGE247	Initiation to job search and securing	30	10		5	45	3
Total		**175**	**100**	**100**	**75**	**450**	**30**

5. Courses content

❖ AGE 111: PHYSICS/ CHEMISTRY

➢ Physics: 3 credits (45 hours); L, T, P, SPW

Objective: To provide the trainees with basic principles of practical physics applicable in agricultural activities in particular and rural development in general.

Course content

1. Introduction
2. Mechanics and statics
3. The matter and its three states
4. Rural electricity

➢ Chemistry : 2 credits (30 hours); L, T, P, SPW

Objective: To introduce students to basic concepts, principles and properties involving the atom, the Periodic Table; the solid, liquid and gaseous states; acids and bases; chemical bonding and chemical changes that accompany chemical reactions.

Course content

The Atom; properties of the electron; the Bohr atom; energy levels in atoms; atomic orbitals; atomic structures and periodicity; bonding in molecules; molecular orbitals; hybridisation; shapes of molecules; chemical equation; the gas laws; explaining the gas laws; the structure of solids; acids; salts and bases; carbon and its compounds; chlorine and its compounds; compounds of nitrogen; sulphur; types of solids; liquid state; changes of state; properties of solutions; solubility; acids and bases; chemical equilibrium; equilibrium calculations.

❖ AGE 112 : Mathematics

➢ Mathematics: 4 credits (60 hours); L, T, P, SPW

Objective: At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

Course content

1. **Importance of agricultural mathematics to students**
2. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
3. **Use of measures on the farm**
   - Linear measures

- Square measure (area)
- Cubic measure (volume)
- Square roots

4. **Weights and their use**
5. **Trigonometric calculations**
6. **Measurement conversions**

❖ AGE 113 : Elements of the functioning of living organisms and human health

➢ **Elements of the Functioning of Living Organisms and Human Health: 5 credits (75 hours); L, T, P, SPW**

Objective: Mobilize knowledge useful in the understanding of biochemical reactions and exchanges between living organisms and their environment

Course content:

1. Composition of living matter, metabolism
2. Exchanges between living organism and their environment
3. Hygiene Rules and practices
4. Rules and practices of human nutrition

❖ AGE 114 : Agronomic Sciences and Techniques

➢ **Agronomic Sciences and Techniques: 5 credits (75 hours); L, T, P, SPW**

Objective: Characterize soil and climatic factors and their influence on agropastoral production

- Use knowledge in plants genetics, morphology and physiology necessary for improving production
- Explain the concept of cropping systems

Course content:

1. Structure, texture, chemical and biological composition, fertility, factors of soil formation, types of soil
2. Techniques to improve and restore soil fertility (development, amendment)
3. Rain fall, temperature, humidity, sunshine, wind
4. Instruments for measuring climatic factors
5. Agro-ecological zones of Cameroon
6. Techniques of mitigating the effect of climate (irrigation, shelters, windbreaks)
7. Concept of soil and climatic potential of a piece of land
8. Morphology, nutrition, reproduction
9. Plant section and multiplication techniques

10. Growth and development of cultivated species- concept of plant and crop cycle (annual and perennial plants)
11. Principles and methods of plants selection
12. Main pests and diseases
13. Different systems of crop production in Cameroon (like agro-forestry)
14. Concept of agro-system
15. Concept of plant population
16. Fallow and crop rotations
17. Concept of cropping itineraries
18. Types of fertilization (chemical, organic, amendment)
19. Links between crop and animal productions

❖ AGE 115 : Zootechnical Sciences and Techniques

➢ Zootechnical Sciences and Techniques: 5 credits (75 hours); L, T, P, SPW

Objective: Use basic knowledge on nutrition and rationing principles to reason out feeding systems and implement feeding plans

- Use knowledge on reproduction to control fertility of a herd
- Explain basic concept related to genetic improvement to understand the implementation of selection and crossing
- Apply the concept of animal health in order to contribute to the maintenance of animal health

Course content:

1. Comparative anatomy of digestive systems
2. Physiology of digestion
3. Feed: composition, types
4. Needs, recommended quantities
5. Methods of feed formulation
6. Feeding systems
7. Anatomy of the reproductive system
8. Oestrus cycle
9. Reproduction cycle: breeding, gestation, parturition
10. Reproductive biotechnologies (preview e.g artificial insemination, embryo transfer)
11. Methods of monitoring reproduction
12. Basis of heredity (simple genetic determinism)
13. Heredity of quantitative characters
14. Principles of selection
15. Crossing
16. Origin of diseases
17. Methods of disease prevention
18. Overview of curative method

19. Collective management of animal health
20. Links between animal disease and human health
21. Animal housing (density, hygiene, prophylaxis)
22. Concept of animal welfare

❖ AGE116: Halieutic and Fisheries Production, Processing and Commercialisation Techniques

- **Halieutic and Fisheries Production, Processing and Commercialisation Techniques:3 credits (45 hours); L, T, P, SPW**

Objective: Reflect on the setting up of aquacultural infrastructures, equipment and installations

- Elaboratetechnical production itineraries
- Reflect on halieutic production system or halieutic production workshop
- Chooseprocessing, conservation, commercialisation techniques of halieuticproducts
- Realize technical operations related to halieutic production and their processing
- Argue the need for a change in practices

Course content :

1. Characteristics of different aquacultural infrastructures
2. Site selection
3. Survey tools
4. Reasoning the development of fish ponds and facilities (stocking, reproduction ponds)
5. Choice and use of equipment, material and installations
6. Maintenance of ponds and surroundings
7. Different aquacultural practices : advantages and disadvantages, conditions of implementation, influence of external factors
8. Presentation and justification of the different steps of technical itinerary:
   - Stocking of ponds with fingerlings
   - Supervising of animals and their environment
   - Feeding
   - Carry out reproduction of animals
   - Animal treatment
   - Sorting, duplication, calibration
   - Harvesting and conditioning
   - Storage
9. Characteristics of different aquacultural system
10. Management of aquacultural system : survival threshold, work calendar, calendar supplies, cash flow, opportunity cost

11. Different processing and conservation practices : advantages and disadvantages, implementation conditions, regulation
12. Presentation and justification of the technical itinerary of the different processing stages (depends on the final product)
13. Modes of commercialisation, marketing techniques, identification of market opportunities
14. Use of materials
15. Realization of maintenance and development work
16. Realization of main interventions and manipulations on halieutic production
17. Realization of processing activities
18. Participatorydiagnosis of aquacultural production
19. Rationale of remedies or solutions proposed : measures of substitution, new practices, recommendations

❖ AGE 117: Bilingual training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**

- Vocabulaire des **affaires**

2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ AGE 121 : Socio economic and regulatory environment of an agropastoral enterprise

➢ **Socio Economic and Regulatory Environment of An Agropastoral Enterprise: 4 credits (60 hours); L, T, P, SPW**

Objective:

- Identify the determinants of agropastoral production
- Identify the determinants of socio-cultural environment
- Describe the organisation of a sector
- Characterize the different types of legal structures and their interest in an agropastoral enterprise
- Identify quality norms applicable to agropastoral products

Course content:

1. Law of demand and supply, law of diminishing returns, market and price, currency, concept of profit, savings and loans
2. Elements of rural sociology (social structure, norms and customs, religions)
3. Sectors (actors and mode of operation)
4. Legal and fiscal structure of agropastoral enterprise (sole proprietorship, CIG, EIG, SARL, Cooperative, Unions of CIG, Federations of unions, Unions of cooperative)
5. Regulations
6. Concept of quality standards (e.g organic farming)
7. Quality norms and specifications
8. Traceability
9. Main regulations
10. Fiscal and social charges

❖ AGE 122 : Communication, Data treatment and Analysis

- **Communication, Data Treatment And Analysis:5 credits (75 hours); L, T, P, SPW**

Objective:

- Implement communication tools and methods adapted to the cultural and socio-professional environment
- Mobilize in a communication setting the basic oral and written lexical and grammatical expressions of the official languages of Cameroon
- Use mathematical and statistical tools to analyse and format information
- Collect data

Course content:

1. Oral and written communication rules
2. Construction of an argument
3. Running meetings
4. Administrative writing (letters, reports, minutes, feedback)
5. Grammar, technical vocabulary related to agropastoral activities, conjugation, reading comprehension, translation, summarising a text
6. Types of information sources
7. Documentary research Techniques
8. Sorting of information
9. Information media
10. Calculation of proportion, conversion, percentages, equation system (two or three unknown variables), geometry (calculation of surface areas and volumes)
11. Probability (random variables, binomial law, normal law, Poisson law, chi-square)

12. Study of variables and calculation of common statistical parameters (mean, median, mode, variance, standard deviation)
13. Graphical representation
14. Manipulation of a computer
15. Use of office and analysis software Word, Excel, Power point, Microsoft Project et SPSS)
16. Search engine on internet
17. Management of electronic mails

❖ AGE 123: Run a livestock production system

➢ Run a Livestock Production System :4 credits (60 hours); L, T, P, SPW

Objective:

- Define the quality of products required and analyse the factors of obtaining them
- To learn the techniques of appreciation, manipulation and intervention on animals
- Analyse the results of a livestock production system
- Implement technical phases in the running of a livestock production unit

Course content:

1. Analyse quality and innovation imperative in the production process (choice of breeders, run a livestock production unit, choice of material and equipment)
2. Quality criteria
3. Regulatory and production standard
4. Factors determining quality
5. Feed formulation: optimization of the feeding system, development of the forage areas, feeding schedule
6. Carry out reproduction: implementing the techniques, reproduction results
7. Ensuring animal health: rules of hygiene, preventive measures, basic curative interventions
8. Adaptation of houses to human and animal requirements
9. Animal behaviour
10. Appreciation of animals (body conditions scoring)
11. Majors manipulations and interventions (e.g. assisting in parturition, injections,...)
12. Technical and economic criteria
13. Calculation of margins

❖ AGE 124 : RUN A CROP PRODUCTION SYSTEM

- **Run a Crop Production System:4 credits (60 hours); L, T, P, SPW**

Objective:

- Define the quality of products required and analyse the factors of obtaining them
- Reason cultural itineraries and post harvest operations
- Acquire practical know-how related to the main interventions on crops
- Analyse production results

Course contenu:

1. Analyse quality and innovation imperatives
2. Regulatory and production standard
3. Establishing a realistic production objective
4. Crop establishment (land preparation and sowing)
5. Fertilisation (fertilizers, amendments, fertilisation plans, calculation of doses)
6. Crop maintenance (intervention opportunity, control)
7. Crop protection (mains pest of crops, treatment products and application precautions, treatment opportunity, cultural methods, calculation of doses)
8. Harvesting operations (identification of signs of maturity, harvesting, measuring of quantities)
9. Storage and conservation (storage loses, factors of product degradation)
10. Pruning
11. Phytosanitary treatment
12. Grafting
13. Marcotting
14. Cuttings
15. Fertilisation
16. Technical and economic criteria
17. Calculation of margins

❖ AGE 125 : Agropastoral Activities and Environmental Issues

- **Agropastoral Activities and Environmental Issues:4 credits (60 hours); L, T, P, SPW**

Objective : Identify the main effects of agropastoral activities on the environment

- Characterize the physical environment of an agropastoral enterprise by indicating its vulnerability
- Realize an agro-environmental diagnosis of an agropastoral enterprise
- Propose measures to limit negative impact of the agropastoral activities on the environment

Course content:

1. Erosion
2. Desertification
3. Destruction of the biodiversity
4. Loss of soil fertility
5. Water contamination
6. Effect of GMOs (Genetically modified organisms)
7. Physical environment of agropastoral enterprise and vulnerability factors (natural resources, biodiversity, greenhouse gases, ollution, climate change, agropastoral activities)
8. Diagnostic methods
9. Concept of sustainable development
10. Protection of the atmosphere
11. Protection of biodiversity
12. Environment laws
13. Fertility management (agro-forestry, amendments)
14. Soil protection
15. Water protection/preservation
16. Waste management

❖ AGE 126 : Internship 1

- **Internship 1 : 6 credits (90 hours); P, SPW**

Objective: The internship 1 is a two month internship in an agro-pastoral enterprise. At the end of this period, the trainee should be able to analyse the functioning of the enterprise, come out with a problem faced by the enterprise and propose possible solutions to the problem.

Course content:

1. Presentation of the enterprise
2. History of the enterprise
3. Administrative and technical organisation of the enterprise
4. Activities of the enterprise
5. Socio-economic analysis of the enterprise
6. Problems and proposed solutions

❖ AGE 127 : Civic and Ethical Education

- **Civic and Ethical Education:3 credits (45 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;

- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ AGE 231 : Agricultural Mechanisation and Agroequipment 1

➢ **Agricultural Mechanisation and Agroequipment 1 :5 credits (75 hours); L, T,P, SPW**

Objective:

- Operate the choice of agricultural machinery for their profitable use
- Manage the use of agropastoral machines and equipment in conformity with the manufacturer's instructions and the environment

Course content:

1. Agricultural machines, engines, tools : characteristics and uses
2. Calculation of cost (cost of utilisation)
3. Running cost, total cost
4. Choice of machines
5. Setting of machines
6. Safety rules
7. Use of motorized or harnessed equipment
8. Handling of tools and equipment

❖ AGE 232 : Business Law

➢ **Business Law : 4 credits (60 hours); L, T, P,SPW**

Objective: At the end of this course, trainees should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Trainees are equally expected to understand the rules and legal provisions

regarding the internal and external operations of a corporate body including the powers of executives.

Course content

1. **Banking Law**
   - Fundamental principles of banking law
   - Bankers/customer relationship
   - Direct debts and credits
   - Guarantees and securities
   - Negotiable instruments
2. **Law of Taxation**
   - Fundamental principles of taxation law fiscal and customs reforms within CEMAC
   - Methods of tax imposition on companies
   - Types of tax regulation
3. **Insurance law**
   - Fundamental principles
   - Insurance interest
   - Utmost good faith (misrepresentation and non-disclosure)
   - Indemnity contribution and subrogation
   - Proximate course
     - Agents and brokers
     - Settlement of insurance claims
     - Application of the CIMA code
4. **Law of Arbitration**
   - Notion of arbitration
   - Other alternatives teachings in resolving conflicts mediation, conciliation and reconciliation
   - Arbitration agreements
   - Arbitration tribunal
   - Proceedings
   - Awards, recognising, enforcing and resisting awards
   - Applicable laws
   - Impact of the OHADA treaty
5. **Intellectual property law**
   - World intellectual property organisation (WIPO) Treaties and their implementation
   - Patent law
   - Design law
   - Trade and service marks law
   - Copy right law
   - Complete and technology law: fundamentals of computer contracts, computer trends and hacking.
   - Other (National or international) Intellectual property organisation.

❖ AGE 233 : Agricultural mecanisation and Agroequipment 2

- **Agricultural Mecanisation and Agroequipment 2: 4 credits (60 hours); L, T,P,SPW**

Objective: Organise the maintenance of machines and agropastoral equipment

Course content:

1. Rules of good use of engine, equipment and tools
2. Maintenance operations of engines (oil change, greasing, cleaning of filters, replacement of parts)
3. Rehabilitation, cleaning and minor repairs of material
4. Management plan of material

❖ AGE 234 : Commercialisation of agropastoral products

- **Commercialisation Of Agropastoral Products: 5 credits (75 hours); L, T, P,SPW**

Objective:

- Identify the market structure to determine selling points
- Set up a marketing strategy for an agropastoral enterprise
- Organize the conditioning and the storage in view of commercialisation

Course content:

1. Organisation of the economic sector and actors, means of market regulations
2. Deed of conveyance
3. Principles and method of market studies (product, price, promotion, place, actors, conditions of access to the market)
4. Analysis of the situation of a given product of an agropastoral enterprise in a territory: characteristics of market, strength and weaknesses of agropastoral enterprise, identification of potential clients, price determination
5. Identification of clients
6. Law of given and supply, competition
7. Actors behavior, concept of a marketer as a whole
8. Commercial transactions
9. Setting up a marketing strategy, consequences and adequacies with the potentials of an agropastoral enterprise (labour, investments to be carry out, treasury)
10. Development of commercial justification
11. Principles and methods of product promotion
12. Principles and methods of conditioning
13. Principles and conservation techniques

14. Principles of work organisation and of premises according to the agropastoral enterprise's modes of commercialisation

❖ AGE 235 : Piloting an agropastoral enterprise 1

- **Piloting an Agropastoral Enterprise 1: 4 credits (60 hours); L, T,P, SPW**

Objective: Describe the global functioning of an enterprise

- Reason a production system adapted to the context of its territory
- Analyse the impact of decision making on the production system
- Analyse the mechanisms for the implementation of an agropastoral project

Course content:

1. Steps for agropastroal enterprise diagnosis
2. Analysis of the strategic choices implemented by a producer
3. Analysis of opportunities and threats of the environment
4. Characterization of production systems
5. Choice of production system
6. Planning of activities of an agropastoral enterprise
7. Technical and economic analysis
8. Opportunity cost
9. Impact of technical choices
10. Partial budget
11. Design a project to improve on an agropastoral project
12. From the idea to the project
13. Life cycle of a project
14. Technical and economic feasibility studies (mobilization of resources)
15. Financial assessment
16. Programming and follow up project
17. Project business plan

❖ AGE 236 : Land acquisition

- **Land acquisition: 5 credits (75 hours); L, T, P, SPW**

Objective:

- Identify land management mechanisms
- Identify land acquisition procedures in its environment

Course content:

1. Majors actors involved and their functions
2. Law and modalities of access to land
3. Modes of enforcement
4. Legal procedures for access to land
5. Land status and securing

❖ AGE 237 : Computer for Business

- **Computer For Business: 3 credits (45 hours); L, T, SPW**

Objective: At the end of the course, the trainee should be able to:
- Know related computing concepts ;
- Have practical hands on using computers.

Course content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current concepts e.g., information services and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services ; e-commerce, mention assorted internet related protocols and standards e.g. http, ftp, html.
8. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
9. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages.

❖ AGE 241 : Standard principles and Quality control

- **Tandard Principles And Quality Control:4 credits (60 hours); L, T, P,SPW**

Objective
- To learn about quality management in food production chain.
- To learn about physical, chemical contaminants in foods
- To understand the significance of safe processing of foods.

Course content

1. **Introduction to food quality control**
   - Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, factors affecting food behavior.
2. **Quality in the Agri-food production chain**

- Techno-managerial approach, food quality relationship and food quality management functions. Dynamics on the agri-food production chain, core developments in food quality management.

❖ AGE 242 : Human resource management

- **Human Resource Management : 5 credits (75hours); L, T, P,SPW**

Objective:

- Organize work in an enterprise
- Set up a follow up mechanism of personnel in compliance with the regulations in force

Course content :

1. Personnel management
2. Behavior of individuals at work
3. Work planning
4. Labor need assessment
5. Principles and methods relative to the coordination of work: preparation, distribution, follow up and evaluation
6. Basic principles of labour law
7. Main provisions concerningworking conditions
8. Social protection provisions
9. Principles and methods of work management : need analysis, recruitment, integration, collective animation of work
10. Administrative follow up: use of document related to the presence of salary earners (work contract, pay rolls, pay slips)
11. Management of the continuous training of personnel
12. Need analysis and organisation of the process of information
13. Organisation of social life in the enterprise
14. Professional risks, health and safety at work

❖ AGE 243 : Economic and Financial Management of an Agropastoral Enterprise

- **Economic and Financial Management of an Agropastoral Enterprise:4 credits (60hours); L, T, P,SPW**

Objective:

- Mobilize basic knowledge of accounting for the management of an agropastoral enterprise
- Analyse a financial situation of an agropastoral enterprise
- Produce technico-economic and strategic decision tools
- Establish budgetary forecasts adapted to the strategic orientations of the agropastoral enterprise

Course content:

1. Accounting concepts, supporting document, accounts, accounting plan, concept of assets, balance sheet
2. Trading account of the enterprise
3. Balance sheet
4. Profit and lost account or end of the year account
5. Working capital
6. Calculation of productivity land, labour, profit, cost, selling price
7. Financial profitability of an investment
8. Analysis of break-even cost
9. Budgetary elements
10. Budget elaboration
11. Sourcing for funds
12. Investment analysis
13. Budget execution
14. Financing plan
15. Cash flow plan

❖ AGE 244 : Food processing and preservation

- **Food Processing and Preservation : 4 credits (60hours); L, T, P,SPW**

Objective: To introduce the principles of the manufacturing processes and technologies used in the production of food products and the preservation issues associated with food quality and safety in food production.

Course content

1. Principles and processes of canning, freezing, dehydrating and fermentation of foods;
2. The use of salt, sugar and additives to preserve food;
3. The importance of food packaging.
4. Food manufacturing processes in the fish, meat, fruit and vegetable, cereal, dairy, beverage and confectionery industries.
5. Principles and techniques of proper handling and preservation of products in these industries. Ingredients such as sweeteners, flavourings, colouring and preservatives.

❖ AGE 245 : Piloting an Agropastoral Enterprise 2

- **Piloting an Agropastoral Enterprise 2 : 4 credits (60hours); L, T, P,SPW**

Objective: Describe the global functioning of an enterprise

- Reason a production system adapted to the context of its territory
- Analyse the impact of decision making on the production system
- Analyse the mechanisms for the implementation of an agropastoral project

Course content:

1. Steps for agropastroal enterprise diagnosis
2. Analysis of the strategic choices implemented by a producer
3. Analysis of opportunities and threats of the environment
4. Characterization of production systems
5. Choice of production system
6. Planning of activities of an agropastoral enterprise
7. Technical and economic analysis
8. Opportunity cost
9. Impact of technical choices
10. Partial budget
11. Design a project to improve on an agropastoral project
12. From the idea to the project
13. Life cycle of a project
14. Technical and economic feasibility studies (mobilization of resources)
15. Financial assessment
16. Programming and follow up project
17. Project business plan

❖ AGE 246 : Internship 2

- **Internship 2 : 6 credits (90hours); P,SPW**

Objective: The internship 2 is a three to four months internship in an agro-pastoral enterprise. At the end of this period, the trainee should be able to carry out production activities and explain the rationale behind each operation.

Course content:

1. Presentation of the enterprise
2. Description of the activities of the enterprise
3. Description of the activities carried out
4. Work management and risk management
5. Marketing of agricultural products

❖ AGE247: Economics and Business Management/ Initiation to Job Search and Securing

- **Economics and Business Management/ Initiation to Job Search and Securing 3 Credits (45 hours) L, T, SPW**

A. Economy and management of agricultural enterprises:

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context

4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

B. Initiation to Job Search and Securing

Objective: Identify the structures in charge of managing employment,Write the essential elements of employment application file,To prepare for a job interview, Secure one's job.

Course content:

1. Employment management structures and their functions (NEF, labour inspection, professional organisations, placement enterprises)
2. Job application
3. Curriculum vitae
4. Motivation letter
5. Recommendation letter
6. Types of job interviews:
   - Oral interviews
   - Writing test
   - Studies of files
7. Behaviors and attitudes to adopt
8. Basic principles of labour law and the main provisions concerning working conditions
9. Social protection conditions
10. Labour contract
11. Obligations of the employer and the employee
12. Individual and collective conflicts management

Necessary Didactic Equipment

Board, chalk, bold marker, video projector, laptop, text books for guidance, farm for demonstration, computer for demonstration, Internet browsing …

ASSESSMENT

- Continuous assessment (CA)
- Final assessment (FA)

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AGRICULTURAL BUSINESS TECHNICS

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: Agricultural Business Technics

1. The objective of the training

This specialisation aims at training professionals who are able to conveniently carry out purchase and/or sales operations related to the agricultural sector; precisely, within the food industry. It consists of five centres of interest: agricultural supplies, beverages, wines and spirits, food products, forestryand plant products. The senior technician is the intermediary between the enterprise which is downstream of production, and the client enterprise and supplier.

2. Skills sought after

→ **General skills**

- Mastery of basic ICT tools;
- Developing a professional attitude with respect to deontology and ethics;
- Working as a team in a training setting and in a professional practice setting;
- Understanding the functioning of organisations;
- Working in a multicultural environment;
- Creating and managing a business;
- Progressively developing an independent learning ability in order to be able to pursue one's personal and professional development throughout one's career.

→ **Specific skills**

- Mastery of the basic concepts of trade and negotiation;
- Possess business skills and a perfect mastery of the food, non-food and agricultural supplies sectors;
- Ability to develop a sales policy for his own business in order to increase turnover;
- Constantly liaising with suppliers and collaborators given that one is leading a sales team;
- Ability to completely lead a department, from the readjustment of a product line to enhancing and promoting the product;
- Ability to handle various aspects and specifics of world markets as well as legislative and fiscal regulations concerning his/her industry segment

3. Career opportunities

- Negotiator – adviser – sedentary or door-to-door salesperson for agro-food and agro-equipment industries;

- Sales representative of products such as fertilizers, seeds and phytosanitary products;
- Representative or assistant in a SME in domains such as agricultural supplies, horticulture, forestry products, pet shop, food products and wine.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Business Techniques					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
ABT111	Physics - Chemistry	45	15	10	5	75	5
ABT112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
ABT113	Food preservation	30	10	15	5	60	4
ABT114	Business policies	30	10	15	5	60	4
ABT115	Norms and quality of agro-products	45	15	10	5	75	5
ABT116	Agro-Marketing	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
ABT117	Bilingual Training	30	10	0	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Business Techniques					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
ABT121	Biochemistry and Microbiology	40	20	10	5	75	5
ABT122	Statistics and Probability	35	20		5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
ABT123	Stock management	30	15	10	5	60	4
ABT124	Value chain of agro-products	45	15	10	5	75	5
ABT125	Marketing I	45	15	25	5	90	5
ABT126	Agro-products markets and domains I	30	5	5	5	45	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
ABT127	Introduction to law/ Civic and Ethical Education/	30	5	5	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Business Techniques					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
ABT231	Food technology	60	25		5	90	5
ABT232	General Accounting	25	15		5	45	4
Professional courses 60% (4 UC) 18 credits 270 hours							
ABT233	Agricultural supplies and equipment	30	10	30	5	75	5
ABT234	Communication techniques	30	10	30	5	75	5
ABT235	Business techniques I	30	10	30	5	75	5
ABT236	Marketing II	20	5	15	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
ABT237	Economics and Management of businesses	30	5	5	5	45	3
Total		**255**	**80**	**110**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Business Techniques					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
ABT241	Agro-products markets and domains II	35	10	10	5	60	4
ABT242	Rural sociology and extension of commercialisation techniques	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
ABT243	Business techniques II	30	15	10	5	60	4
ABT244	Hygiene and quality of agro-products	40	5	10	5	60	4
ABT245	Methods of transformation of products	30	10	20	0	60	4
ABT246	Internship	0	0	60	30	60	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
ABT247	Computer and Multimedia	25	5	10	5	45	3
Total		**205**	**60**	**130**	**55**	**450**	**30**

5. Courses content

❖ ABT 111: Physics - Chemistry

- **Physics - Chemistry: 5 credits (75 hours); L,T,P, SPW**

1. Electrostatics
2. Fluids mechanics
3. Mineral chemistry
4. Organic chemistry

❖ ABT 112: Mathematics

- **Mathematics: 4 credits (60 hours); T, P, P, SPW**

1. Algebra
2. Mathematical Analysis

❖ ABT 113: Food preservation

- **Food preservation: 4 credits (60 hours), L, T, P, SPW**

1. Methods of preserving food products
2. Procedures of types of preservation: cold and warm
3. Handling of food products

❖ ABT 114: Business policies

- **Business policies: 4 credits (60 hours); L, T, P, SPW**

1. Main regulations relating to the commercialisation of agro-pastoral products
2. International trade
3. Business Law and Contracts

❖ ABT 115: Norms and quality of agro-products

- **Norms and quality of agro-products: 5 credits (75 hours); L, T, P, SPW**

1. Hygiene rules for handling agro-products
2. HCCP methods

❖ ABT 116: Agro-Marketing

- **Agro-Marketing : 5 credits (75 hours); L, T, P, SPW**

1. Analysis of the market structure of agro-pastoral products
2. Agro-pastoral business strategy development
3. General marketing

❖ ABT 117: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;

- Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
- Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ ABT 121: Biochemistry and Microbiology

➢ **Biochemistry and Microbiology: 5 credits (75 hours): L, T, P, SPW**

1. Biochemistry
2. Food microbiology

❖ ABT 122: Statistics and Probability

➢ **Statistics and Probability: 4 credits (60 hours); L, T, P,SPW**

1. Principles of Sampling
2. Collection, analysis and treatment of data

❖ ABT 123: Stock management

➢ **Stock management: 4 credits (60 hours); L, T, P, SPW**

1. Agro-products and equipment stock management
2.

❖ ABT124: Value chain of agro-products

➢ **Value chain of agro-products: 5 credits (75 hours); L, T, P, SPW**

1. Value chain concept

2. Key players and links of the agricultural sector
3. Constraints and opportunities in the agricultural sector

❖ ABT 125: Marketing I

- **Marketing I : 5 credits (75 hours); L, T, P, SPW**

1. International trade of agro-products
2. Relationship between the field of agriculture and other sectors of the economy
3. Concept of marketing
4. Management of agro-product sales
5. Management of an agricultural unit
6. Pricing techniques
7. Agro-products packaging techniques

❖ ABT 126: Agro-products markets and domains I

- **Agro-products marketsand domains I: 4credits (60 hours); L, T, P, SPW**

1. Agricultural and food markets I
2. Agricultural fields I
3. Governance and cooperation approaches within the field of agriculture

❖ ABT127: Introduction to law/Civic Education and Ethics

- **Introduction to law : 2 credits (30 hours); L, T, SPW**

B. Land law

1. **Private property**
2. **Recall of legislative acts in force**
   - Study of decree No. 76/165 of 23 April 1976 laying down conditions for obtaining a land title;
   - Study of ordinance No. 7V2 of 6 July 1974 laying down the domanial regime;
   - Study of ordinance No. 77/1 of 10 January 1977 amending ordinance No. 1 of 5 July 1974.
3. **The Land title**
   - Definition;
   - Procedures for obtaining a land title;
   - Transfer of real rights from the title.

Labour and business law

D. Labour law

1. Judicial organization and national political institutions;

2. History of trade unions;
3. Evolution of labour law;
4. Collective agreements;
5. Employment contract (form, suspension, termination)
6. Remuneration and social security contributions
7. Legislation – security
8. Hygiene and security standards;
9. Subcontracting;
10. Economic and judicial provisions;
11. Staff representative (staff delegate, trade union delegates);
12. Social security;
13. Retirement.

E. Business law

1. **The key players of a commercial enterprise**
   - Access to the profession;
   - Consequences of the quality of the trader.
2. **The trader's goods**
   - The business capital;
   - The business lease;
   - Transfer of the business;
   - Pledging of a business.
3. **Regulated commercial contracts**
   - Commercial sale;
   - Intermediation contracts;
   - General obligations incumbent upon intermediaries.

F. Maritime law

1. **Concept of fishing zone**
   - Continental shelf;
   - Exclusive economic zone, etc…
2. **Legal regime of a maritime and continental fishing zone**
3. **International fisheries organisation**
4. **Typology of international conflicts and mechanisms for peaceful conflict resolution**
5. **Law of the sea and maritime pollution regulation**
   - Pollution by ships;
   - Maritime accidents and environmental emergency;
   - Liability for damages;
   - Dangerous substances.
6. **Conservation of marine resources**
   - General regime and regional organisations.
7. **National regulation for the marine environment**

- **Civic and Ethical Education : 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ ABT 231: Food technology

- **Food technology: 5 credits (75 hours); L, T, P,SPW**

1. Handling and preservation techniques
2. Transformation techniques
3. Diversification activities

❖ ABT 232: General Accounting

- **General Accounting: 4 credits (60 hours); L, T, P,SPW**

1. **The business and its assets**
   - Business concept;
   - Balance sheet and its variations.
2. **Analysis of the current operations of the business**
   - Uses/Resources concept;
   - Accounting transfers;
   - Trial balance accounts.
3. **Purchase and sale operations**
   - Billing;

- Accounting entry;
- Inventory system;
- Stock record card.

4. **Term settlements: Commercial paper**
   - Definition;
   - Principles;
   - Calculations.
5. **Amortisation and provisions**
   - Definition;
   - Accounting entry.

❖ ABT 233: Business techniques II

➢ **Business techniques I: 5 credits (75 hours); L, T, P, SPW**

1. Agricultural supplies
2. Agricultural equipment
3. Agricultural machinery
4. Agricultural mechanisation
5. Mechanic concepts of agricultural machinery

❖ ABT 234: Communication techniques

➢ **Communication techniques: 5 credits (75 hours); L, T, P, SPW**

1. French and English expression
2. Communication techniques

❖ ABT 235: Business techniques I

➢ **Business techniques I: 5 credits (75 hours); L, T, P, SPW**

1. Types of trade
2. Sales and purchase agreements
3. Rules of trade
4. Price fixing and types of negotiation

❖ ABT 236: Marketing II

➢ **Marketing II : 3 credits (45 hours); L, T, P, SPW**

1. International trade of agro-products
2. Relationship between the field of agriculture and other sectors of the economy

❖ ABT 237: Economics and management of businesses

- **Economics: 2 credits (30hours); L, T, P, SPW**

    1. General and applied economics

- **Management of Businesses:1 credits (15 hours); L, T, P, SPW**

    1. Business Management
    2. Concept of planning and agro-pastoral entrepreneurship

❖ ABT 241: Agro-products markets and domains II

- **Agro-products markets and domains II: 4 credits (60 hours); L, T, P, SPW**

    1. Agricultural and food markets II
    2. Agricultural fields II
    3. Governance and cooperation approaches within the field of agriculture

❖ ABT 242: Rural sociology and Extension of commercialisation techniques

- **Rural sociology and Extension of commercialisation techniques: 5 credits (75 hours); L, T, P, SPW**

    1. Rural sociology
    2. Concept of added value
    3. Commercialisation techniques

❖ ABT 243: Business techniques II

- **Business techniques: 4 credits (60 hours); L, T, P, SPW**

    1. Types of trade
    2. Sales and purchase agreements
    3. Rules of trade
    4. Price fixing and types of negotiation

❖ ABT 244: Hygiene and quality of agro-products

- **Hygiene and quality of agro-products: 4 credits (60 hours); L, T, P, SPW**

    1. Hygiene rules for handling agro-products
    2. HCCP method
    3. Packaging and preservation

❖ ABT 245: Methods of transformation of products

- **Methods of transformation of products: 4 credits (60 hours); L, T, P, SPW**

1. Methods of transformation
2. Temperature and pressure conditions for preservation

❖ ABT 246: Professional internship

- **Professional internship: 6 credits (90 hours); P, SPW**

1. Arrival and integration in the enterprise
2. Work within the enterprise
3. Keeping an intern journal
4. Choice of project topic in collaboration with the professional and academic supervisor
5. Elaboration of the research design
6. Resources to be exploited
7. Organisation of work
8. Report writing
9. Presentation of the report before a jury

❖ ABT 247: Computer and Multimedia

- **Computer and Multimedia: 3 credits (45 hours) L, T, P, SPW**

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

Content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current notions e.g., information society and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer).
8. Information Services ;
9. E-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
10. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;

11. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AQUACULTURE

Field: AGRICULTURAL AND FOOD SCIENCES

Specialty: **Aquaculture**

1. The objective of the training

This specialisation enables the mastery of natural and artificial aquatic milieus, the setting up of hatchery agricultural production to transformation, ensuring control and follow-up, but also, carrying out market analysis while protecting the environment and respecting sanitary and veterinary regulations with regard to water policy and rural code dispositions.

2. Skills sought after

→ **Generic skills**

- Mastery of basic ICT tools;
- Developing a professional attitude with respect to deontology and ethics;
- Working as a team in a training setting and in a professional practice setting;
- Understanding the functioning of organisations;
- Working in a multicultural environment;
- Creating and managing a business;
- Progressively developing an independent learning ability in order to be able to pursue one's personal and professional development throughout one's career.

→ **Specific skills**

- Mastery of techniques and tools of aquatic production;
- Carrying out an installation project (building, canalisation, dyke…)
- Calculation of a financial plan while taking into account loans and subsidies;
- Choosing species to rear based on the potential of the milieu and the constraints of the rearing site;
- Paying constant attention to the protection of the environment;
- Conducting a specialised production system (feeding of animals, control of reproduction cycles, selection operations, following-up the health of livestock, preparation for sale);
- Mastery of animal husbandry and commercialisation of aquatic plants and animals;
- Knowing the tools and methods of solving problems of the aquaculture sector.

3. Career opportunities

- Work supervisor;
- Aquaculture technician;
- Operations manager / Aquaculture business manager;
- Executive in an aquaculture production business in the domain of commerce, of the distribution of seafood products, of the transformation industry, of fisheries and tourism;
- Research and development laboratory technician;
- Technical adviser or technical sales personnel;
- Manager of an aquaculture business;
- Running one's personal business as a pisciculturist or shellfish farmer;
- Managing one's personal operations;
- Working in much more independent sectors like the cultivation of algae, rearing of crustaceans, marine aquarophilia or inland or pocket fishing.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Aquaculture					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AQU111	Physics and Chemistry	45	15	10	5	75	5
AQU112	Mathematics	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AQU113	Applied Ecology	30	10	15	5	60	4
AQU114	Biology	30	10	15	5	60	4
AQU115	Aquatic Ecosystems	45	15	10	5	75	5
AQU116	Anatomy and physiology of aquatic species	45	15	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AQU117	Bilingual Training	30	10	0	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Aquaculture					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AQU121	Biochemistry and Microbiology	40	20	10	5	75	5
AQU122	Statistics and Probability	35	20	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AQU123	Climatology and Meteorology	30	15	10	5	60	4
AQU124	Pathology of aquatic species	45	15	10	5	75	5
AQU125	Food and Nutrition in Aquaculture	45	15	25	5	90	6
AQU126	Markets and domains of fishery products	30	5	5	5	45	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AQU127	Introduction to law/ Civic and Ethical Education/	30	5	5	5	45	3
Total		**255**	**95**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Aquaculture					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AQU231	Genetics and Selection of aquatic species	30	10	30	5	75	5
AQU232	General Accounting	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AQU233	Fish farming	30	10	30	5	75	5
AQU234	Shrimp farming	30	10	30	5	75	5
AQU235	Oyster farming	30	10	30	5	75	5
AQU236	Applied topography and construction of aquaculture farmsteads	20	5	15	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AQU237	Economics and Management of agro-businesses	30	5	5	5	45	3
Total		**255**	**80**	**110**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Aquaculture					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AQU241	Markets and domains of aquaculture products	35	10	10	5	60	4
AQU242	Rural sociology and extension of techniques	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AQU243	Fish technology	30	15	10	5	60	4
AQU244	Hygiene and quality of aquaculture products	40	5	10	5	60	4
AQU245	Food and Nutrition in Aquaculture	30	10	20	0	60	4
AQU246	Mechanisation and equipment in aquaculture	0	0	60	30	60	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AQU247	Computer and Multimedia	25	5	10	5	45	3
Total		**205**	**60**	**130**	**55**	**450**	**30**

5. Courses content

❖ AQU 111 : Physics and Chemistry

➢ Physics and Chemistry: 5 credits (75 hours); L, T, P, SPW

1. **General Physics**
   - Introduction to classical Physics;
   - Radiation-matter-radiation interactions;
   - Point, solid and fluid mechanics concepts;
   - Electricity and electromagnetism.

1. **Biophysics**
   - Concept of physical and chemical thermodynamics;
   - Acid-base properties of solutions;
   - Transmembrane transport;
   - Interaction of radiations with matter;
   - Radiation: production, properties;
   - Biological effects of ionizing radiations;
   - Sound waves;
   - Optical elements.

2. **Mineral Chemistry**
   - Basic concepts: Recall of concepts of atoms, molecules and mole etc…
   - Electronegativity of elements, types of bonding, isometry, nomenclature;
   - Summary study of Bloc S elements;
   - Summary study of Bloc P elements;
   - Summary study of transition elements;

3. **Organic chemistry**
   - Basic concepts;
   - Metal lattice;
   - Ionic lattice;
   - Molecular lattice;
   - Main functions of organic chemistry;
   - Alkanes, cyclo-alkanes, alkenes, alkynes, aromatics;
   - Halogen derivatives;
   - Organometallic derivatives, alcohols, thiols, ether oxides, thioethers and amines.

4. **Marine chemistry**
   - Description of physical and chemical properties of sea water. Composition of major and minor elements;
   - Air/sea and water/sediment interface chemistry
   - Oxidation-reduction reactions, redox potential;
   - Carbon, nitrogen and silicon cycles in ocean and estuary milieus;
   - Dynamics affecting metals, organic matter in oceans and estuaries.

❖ AQU 112 : Mathematics

➢ Mathematics : 4 credits (60 hours); T, P, P, SPW

1. Real sequences and series;
2. Numerical Functions;
3. Integral calculus (primitives, surface and volume integral);
4. First and second-order differential equations;
5. Use of computer tools for solving equations and for integral calculus via numerical methods;
6. Vector space;
7. Linear mapping;
8. Real sequences and series;
9. Numerical Functions;
10. Integral calculus (primitives, surface and volume integral);
11. First and second-order differential equations;
12. Use of computer tools for solving equations and for integral calculus via numerical methods;
13. Vector space;
14. Linear mapping;
15. Matrix calculation (Determinant, order of matrix, eigenvalue, diagonalisation of matrices);
16. Polynomials, divisions, rational fractions;
17. Planar curves.

❖ AQU 113 : Applied ecology

➢ Applied ecology : 4 credits (60 hours), L, T, P, SPW

Aquatic ecology

1. **History and definition**
   - Key organization levels and population characteristics;
   - Basic principles and concepts related to ecology.
2. **Abiotic factors**
   - Organisation of matter and transfer of energy;
   - Population and community.
3. **Habitat and ecological niche**
   - Ecosystem concepts.
4. **Mangrove ecosystems**
5. **Fresh water and marine aquatic ecosystems**
   - Ecological inventory techniques.

❖ AQU 114: Biology

➢ Biology: 4 credits (60 hours); L, T, P, SPW

A. General Biology I

1. **Origin of life and cellular organization**
   - Molecular bases of life;
   - Cell morphology;
   - Cell physiology;
     - Metabolism;
     - Membrane phenomena;
     - Cellular mechanisms of reproduction.
2. **Multicellular organization**
   - Cell differentiation;
   - Structural organization levels.
3. **Self-preservation and auto-regulation**
4. **Self-reproduction**
   - Modes of reproduction;
   - Vital cycles.

B. General Biology II

1. **Important organic compounds in Biology**
   - Properties of enzymes and enzyme activity;
   - Prokaryotic and Eukaryotic cells (animal and plant).
2. **Tissular organisation**

C. Biological bases of aquaculture

1. **Introduction, history, definition and status of aquaculture**
2. **Reproduction biology**
   - Diversity of reproduction modes in fish;
   - Male and female reproductive systems;
   - Maturity and reproduction cycles;
   - Composition of gametes;
   - Effect of environmental factors on egg laying;
   - Embryo and larva development;
   - Control of the quality of gametes, sexual maturity and reproduction.
3. **Bioenergetics**
   - Ingestion absorption;
   - Excretion;
   - Metabolism;
   - Feeding and growth;
   - Stress in fish;
     - Endocrine responses;
     - Physiology;
     - Tertiary.
   - Stressors in aquaculture.

- Acute stressors;
- Chronic stressors;
- Stress management in aquaculture.

❖ AQU 115: Aquatic ecosystems

➢ Aquatic ecosystems: 5 credits (75 hours); L, T, P, SPW

1. **Organisation of an ecosystem**
   - What is an aquatic ecosystem?
   - Species living in an aquatic ecosystem;
   - Importance of dissolved gases for an aquatic ecosystem.
   - How does an aquatic ecosystem work?
2. **Evolution of an ecosystem**
   - Disruption of balance;
   - Eutrophication.
3. **Marine aquatic systems**
   - Fresh water;
   - Lagoon;
   - Mangrove;
   - Lagoon areas (brackish water);
   - Fresh water milieu;
   - Lakes;
   - Ponds;
   - Water course (stream, rivers);
   - Flood-risk and humid areas (marsh and peatbog);
   - Groundwater;
   - Estuaries.
4. **Functioning of an aquatic ecosystem**
   - Aquatic plants and algae;
   - Consumers;
   - Decomposers;
   - Food chain.

❖ AQU 116: Anatomy and physiology of aquatic species

➢ Anatomy and physiology of aquatic species: 5 credits (75 hours); L, T, P, SPW

1. **Histology and functions of tissues and organs**
2. **Anatomy of studied systems**
   - Digestive system;
   - Respiratory system;
   - Excretory and homeostatic system;
   - Nervous system, endocrine system;
   - Locomotory system;
   - Reproductive system

❖ AQU 117: Bilingual Training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ AQU 121: Biochemistry and Microbiology

➢ Biochemistry and Microbiology : 5 credits (75 hours): L, T, P, SPW

1. **Biochemistry**
   - Introduction;
   - Structure of water;
   - Amino acids;
   - Fundamentals of biochemistry in association with those of organic chemistry. Carbohydrates;
   - Concepts of stereochemistry and applied isometry;
   - Concept of natural polymers associated to its products. Lipids, amino acids, peptides and proteins;
   - Carbohydrates;
   - Concept of amino acid sequences;
   - Introduction to enzymology, metabolic pathways, and energy transfer phenomena.
2. **Microbiology**
   - Introduction and generalities;
   - General bacteriology;
   - General virology;
   - General mycology;
   - General parasitology;
   - Host parasite relationships;
   - General immunology.

❖ AQU 122: Statistics and Probability

➢ Statistics and Probability : 5 credits (75 hours); L, T, SPW

1. **Descriptive statistics**
2. **Correlation and regression**
3. **Statistical series**
   - Mathematical definition and presentation;
   - Graphical representation;
   - Cumulative effects;
   - Central position parameter (average and mean);
   - Dispersion parameters (variance, standard deviation, etc).
4. **Variance analysis**
5. **Probabilistic statistics**
6. **Laws of probability**
7. **Random variables**
8. **Reliability**
9. **Bivariate statistical series with real variables**
   - Mathematical definition and presentation;
   - Covariance;
   - Graphical representation;
   - Linear and non-linear regression;
   - Linear correlation.
10. **Inferential statistics**
11. **Time series**
    - Definition and models;
    - Components;
    - Analysis and forecast;
    - Arrangements;
    - Combinations.
12. **Fundamentals of probability theory**
13. **Sampling and hypothesis testing**
14. **Statistical Process Control (SPC)**

❖ AQU 123: Climatology and Meteorology

➢ Climatology and Meteorology: 4 credits (60 hours); L, T, P, SPW

Objective:

Enable students diagnose farming problems and find appropriate solutions. Equip the students with knowledge of the physical forces and dynamic elements of weather and climate as they affect agricultural production especially within the tropical regions with which the students are familiar.

1. **Definition of the basic concepts**

- Climate Change

2. **Tools of Meteorology**
   - Collection and transmission of data;
   - Applications of meteorology.

❖ AQU 124: Pathology of aquatic species

➢ Pathology of aquatic species: 5 credits (75 hours); L, T, P, SPW

1. General anatomy
2. Diseases in fish, crustaceans and other aquatic species
3. Fish as an indicator of the quality of the milieu
4. Sampling for pathology analysis
5. Sanitary management of aquaculture farms

❖ AQU 125: Food and Nutrition in aquaculture

➢ Food and Nutrition in aquaculture: 5 credits (75hours); L, T, P, SPW

1. Different food groups (live food and compound feed);
2. Growing of live food (crustaceans: daphnia, moina, artemia, chironomids, oligochaetes, and mollusk);
3. Production of compound feed (granular);
4. Composition of food according to age;
5. Feeding of aquatic species.

❖ AQU126: Markets and domains of fishery products

➢ Markets and domains of fishery products I: 4credits (60hours); L, T, P, SPW

1. **Market of aquaculture products: structure, evolution and prospects**
   - Aquaculture products at the local, national, African and international level;
   - Evolution prospects and stakes;
   - Current issues and stakes involved, the place and the role of different aquaculture products from different points of view, e.g.
     - Needs linked to demographic and economic development;
     - Interests of production and consumption areas (at the national, African and international levels);
     - Food security;
     - Strategies of key players (States, big firms, producers etc);
     - Possible uses (feeding, energy, industry);
     - Research and innovation;
     - Environmental issues;
     - Use of water;

- Volatility and pricing;
- Production modes.

❖ AQU127: Introduction to law/ Civic and Ethical Education

➢ Introduction to law: 2 credits (30 hours); L, T, SPW

Civil law and Land law

A. Civil law

B. Land law

1. **Private property**
2. **Recall of legislative acts in force**
   - Study of decree No. 76/165 of 23 April 1976 laying down conditions for obtaining a land title;
   - Study of ordinance No. 7V2 of 6 July 1974 laying down the domanial regime;
   - Study of ordinance No. 77/1 of 10 January 1977 amending ordinance No. 1 of 5 July 1974.
3. **The Land title**
   - Definition;
   - Procedures for obtaining a land title;
   - Transfer of real rights from the title.

Labour and business law

A. Labour law

1. Judicial organization and national political institutions;
2. History of trade unions;
3. Evolution of labour law;
4. Collective agreements;
5. Employment contract (form, suspension, termination)
6. Remuneration and social security contributions
7. Legislation – security
8. Hygiene and security standards;
9. Subcontracting;
10. Economic and judicial provisions;
11. Staff representative (staff delegate, trade union delegates);
12. Social security;
13. Retirement.

B. Business law

1. **The key players of a commercial enterprise**
   - Access to the profession;

- Consequences of the quality of the trader.

2. **The trader's goods**
   - The business capital;
   - The business lease;
   - Transfer of the business;
   - Pledging of a business.
3. **Regulated commercial contracts**
   - Commercial sale;
   - Intermediation contracts;
   - General obligations incumbent upon intermediaries.

C. Maritime law

1. **Concept of fishing zone**
   - Continental shelf;
   - Exclusive economic zone, etc…
2. **Legal regime of a maritime and continental fishing zone**
3. **International fisheries organisation**
4. **Typology of international conflicts and mechanisms for peaceful conflict resolution**
5. **Law of the sea and maritime pollution regulation**
   - Pollution by ships;
   - Maritime accidents and environmental emergency;
   - Liability for damages;
   - Dangerous substances.
6. **Conservation of marine resources**
   - General regime and regional organisations.
7. **National regulation for the marine environment**

- **Civic and Ethical Education : 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights

- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ AQU 231 : Genetics and selection of aquatic species

➢ Genetics and selection of aquatic species: 5 credits (75 hours); L, T,P, SPW

Objectives

1. Explain genetic influence on the characteristics exhibited by animals.
2. Explain the factors that interact with genes to produce nonconformity in animals.
3. Develop procedures to select animals for a breeding program.
4. Develop an animal straight breeding program.
5. Develop an animal cross breeding program.
6. Explain the commercial methods used to breed farm animals.

❖ AQU 232: General Accounting

➢ General Accounting : 4 credits (60 hours); L, T, P, SPW

1. **The business and its assets**
   - Business concept;
   - Balance sheet and its variations.
2. **Analysis of the current operations of the business**
   - Uses/Resources concept;
   - Accounting transfers;
   - Trial balance accounts.
3. **Purchase and sale operations**
   - Billing;
   - Accounting entry;
   - Inventory system;
   - Stock record card.
4. **Term settlements: Commercial paper**
   - Definition;
   - Principles;
5. **The business and its assets**
   - Business concept;
   - Balance sheet and its variations.
6. **Analysis of the current operations of the business**
   - Uses/Resources concept;

- Accounting transfers;
- Trial balance accounts.

7. **Purchase and sale operations**
   - Billing;
   - Accounting entry;
   - Inventory system;
   - Stock record card.
8. **Term settlements: Commercial paper**
   - Definition;
   - Principles;
   - Calculations.
9. **Amortisation and provisions**
   - Definition;
   - Accounting entry.

❖ AQU 233: Conducting fish farming

➢ **Conducting fish farming: 5 credits (75 hours); L, T, P, SPW**

❖ AQU 234: Conducting prawn farming

➢ **Conducting prawn farming: 5 credits (75 hours); L, T, P, SPW**

❖ AQU 235: Conducting oyster farming

➢ **Conducting oyster farming: 5 credits (75 hours); L, T, P, SPW**

❖ AQC 236: Applied topography and construction of farmsteads

➢ **Applied topography and construction of farmsteads: 3 credits (45 hours); L, T, P, SPW**

❖ AQC 237: Economics and management of agri-businesses

➢ **Economics and management of agri-businesses: 3 credits (45 hours); L, T, SPW**

1. Main administrative, trade union and professional institutions
2. Functioning of local governments and development agencies
3. Business activities in the economic and social context
4. Elements of commercial and social law
5. Organisation methods
6. Analysis of needs and determination of a strategy
7. Creativity techniques
8. Economic environment and growth

9. Functional organisation of the enterprise
10. Business Accounting
11. Accounting agreements
12. Treasury operations
13. Management of human resources
14. Procurement, credit and third party management
15. Corporate communication
16. Administrative procedures
17. Elements of corporate taxation
18. Financial analysis and investments
19. Budget management

❖ AQU 241: Markets and domains of aquaculture products

- **Markets and domains of aquaculture products : 4 credits (60 hours); L, T, P, SPW**

1. **Objectives and intervention modes of public authorities**
   - Foundations of aquaculture policies;
   - Current aquaculture policies: national and African approach;
   - Cameroonian and African aquaculture policies in an international context.
2. **Functioning of aquaculture production field**
   - Commercialisation, distribution channel, aquaculture policy, world market, trade agreement, economic competition, pricing, production, aquaculture product, food product, international trade, agro-food industries, transformation, mass distribution, concentration, integration, professional organisations, added value, consumption.

❖ AQU 242: Rural sociology and Extension of commercialisation techniques

- **Rural sociology and Extension of commercialisation techniques: 5 credits (75 hours); L, T, P, SPW**

1. **Introduction**
   - Reflection on the concept of agricultural development;
   - Importance of human factors in agricultural development projects;
   - Genesis and definition of sociology – origin and expansion of rural sociology.
2. **Conceptual framework**
   - Definition of some basic concepts of sociology;
   - Characteristics and implantation into agricultural development programs
3. **Study of key social institutions**

- Family, economic, political, religious, education and recreation institutions.

4. **Social changes**
5. **Application of sociological research to agricultural development programs**
   - Extension of innovations, rural exodus, demography, problem of colonisation, agrarian reform, agricultural extension and rural animation.

❖ AQU 243: Fish technology and diagnosis of species

➢ Fish technology and diagnosis of species: 4 credits (60 hours); L, T, P, SPW

1. **Knowledge of the fishing map of Cameroon and the CEMAC sub-region in terms of geography and fish species**
2. **Regulation**
3. **Evaluation of the impact of ecological, biophysical, and meteorological factors on fishing**
4. **Types and characteristics of fishing gear (quality, cost, use, etc.)**
5. **Elaboration of a bathymetric map and a hypsometric curve**
6. **Analysis of morphometric data,**
   - Determination of the average depth;
   - Physico-chemical analysis of water;
   - Description of benthos organic sediment (qualitative and quantitative) and seston (quantitative).
7. **Inventory and cartography of aquatic vegetation**
   - Inventory of riparian sediments;
   - Study of three areas: shore, beach and strandline.
8. **Determination of the trophic level and the aging diagram**
9. **Potential for little tolerance organisms, potential of riparian segments for spawn, habitat and fish food.**

❖ AQU 244: Hygiene and quality of aquaculture products

➢ Hygiene and quality of aquaculture products: 4 credits (60 hours); L, T, P, SPW

1. Sanitary inspection of fishery products (quality criteria, freshness criteria)
2. Seafood regulation and techno-regulatory control
3. Definition of norms and technical study on the quality of products
4. Molecular tools for the diagnosis of species necessary for tracing raw materials and food products
5. Impact of capture and farming techniques of fishery resources on quality
6. Meteorology: Standardisation and quality control of fishery products

❖ AQU 245: Mechanisation and equipment in aquaculture

- **Mechanisation and equipment in aquaculture: 4 credits (60 hours); L, T, P, SPW**

❖ AQC 246: Professional internship

- **Professional internship: 6 credits (90 hours); P, SPW**

1. Arrival and integration in the enterprise;
2. Work within the enterprise;
3. Keeping an intern journal;
4. Choice of project topic in collaboration with the professional and academic supervisor;
5. Elaboration of the research design;
6. Resources to be exploited;
7. Organisation of work;
8. Report writing;
9. Presentation of the report before a jury.
10. Budget management

❖ AQC 247: Computer and Multimedia

- **Computer and Multimedia: 3 credits (45 hours) L, T, P, SPW**

Objective: At the end of the course, the student should be able to know related computing concepts and have practical hands on using computers.

Content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current notions e.g., information society and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer).
8. Information Services ;
9. E-commerce, mention assorted internet relatedprotocols and standards e.g. htP, fP, html.
10. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;
11. Conceptual (abstract) view/layout of problem handled be given packages, optional, packages, presentation graphics and graphing packages

Field : AGRICULTURAL AND FOOD SCIENCES

Specialty :

AGRICULTURAL PRODUCTION TECHNOLOGY

Field:	AGRICULTURAL AND FOOD SCIENCES

Specialty:	Agricultural Production Technology

1. The objective of the training

Training students in Agricultural Production Technology would be adequately prepared to take or make sound technical decisions, regarding the most suitable location for successful establishment and profitable production of the major crops and animals.

2. Skills sought after

→ **General skills**

- Develop a professional attitude in the respect of the deontology and the ethics
- Maintain basic computer tools
- Create and manage a business
- Develop a learning autonomy
- Understand how organizations work
- Work in a multicultural environment
- Work as a team in a training environment and in a professional practice environment
- Use data collection and processing techniques
- Implement research and job security actions
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career

→ **Specific skills**

- Analysis and consulting in the management of crop and animal production
- Management and scheduling of the means of production
- Mobilize basic knowledge in agronomy and zootechnics
- Conduct of business or farming systems on territories and within socio-professional sector
- Understand crop and animal needs
- Understand basic crop and animal reproduction
- Understand strengths and weaknesses of crop and animal production
- Understand biosecurity threats in the agriculture industry
- Identify causes of crop and animal illnesses / diseases and parasites

3. Career opportunities

- Ministries related to crops/animals and products
- Crop/animal production farms
- Agro-industries
- Self-employed in crop/animal production and/or processing
- Operations manager within a company
- Agricultural Adviser (agricultural chamber, technical institute)
- Responsible for a supply unit (Cooperative, Chamber of agriculture)
- Technician breeder or experimenter in a research institute or a seed firm
- Technician of seed multiplication
- Technico-commercial in the distribution of agricultural products
- Commercial delegate and services in a trading company

4. Organization of teachings

- **FIRST SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT111	Introduction to Microbiology / Introduction to Biochemistry	30	15	10	5	60	4
APT112	Mathematics / Farming System	35	15	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
APT113	Introduction to Agriculture / Introduction to Soil science	35	15	20	5	75	5
APT114	Agricultural Economics / Food & human Nutrition	20	10	25	5	60	4
APT115	Agrostology / Animal Breeding & Genetics	35	15	20	5	75	5
APT116	Farm mechanization / Farm Practice 1	25	10	20	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT117	Bilingual training	30	10		5	45	3
Total		**210**	**90**	**115**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT121	Statistics & Probabilities	30	15	10	5	60	4
APT122	Principles of Environmental Science / Agroclimatology	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
APT123	Animal Anatomy & Physiology / Animal Nutrition	35	15	5	5	60	4
APT124	Principles of seed production / Principles of Crop Protection	35	15	5	5	60	4
APT125	Industrial Crop Production / Farm Practice 2	30	15	10	5	60	4
APT126	Internship 1			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT127	Civic& Ethical Education	20	5	15	5	45	3
Total		**195**	**80**	**145**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT231	Agricultural Experimentation & Designs / Post Harvest Technology	30	15	10	5	60	4
APT232	Farm & Resource Management / Soil & Water Conservation	35	15	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
APT233	Cattle Production / Pig Production	35	15	5	5	60	4
APT234	Cereal Production / Root & Tuber Production	20	10	25	5	60	4
APT235	Sheep & Goat Production / Poultry Production	35	15	5	5	60	4
APT236	Soil Fertility and Plant Nutrition/ Fruit & Vegetable Production	45	20	5	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT237	Business Law	30	10		5	45	3
Total		**185**	**80**	**125**	**60**	**450**	**30**

- **FOURTH SEMESTER**

Field: Agricultural and Food Sciences		Specialty: Agricultural Production Technology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
APT241	Agricultural Marketing	40	25	5	5	75	5
APT242	Agroforestry	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
APT243	Parasitology/ Pesticide Application & Management	45	20	5	5	75	5
APT244	Principles of Aquaculture / Agricultural Extension Education	40	10	5	5	60	4
APT245	Principles of Food Technology / Food Processing & Preservation	30	10	15	5	60	4
APT246	Internship 2			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
APT247	Computer for Business	30	10		5	45	3
Total		**260**	**110**	**45**	**35**	**450**	**30**

5. Courses content

❖ APT111: Introduction to Microbiology/Introduction to Biochemistry

- **Introduction to Microbiology: 4 credits (60 hours); L, T, P, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms for plants and domestic animals.

Course content:

1. Chapter 1: Definition
2. Chapter 2: Classification of microorganisms
3. Chapter 3: Methods of classification
4. Chapter 4: Bacteria
5. Chapter 5: Mycoplasmas
6. Chapter 6: Rickettsiae
7. Chapter 7: Fungi
8. Chapter 8: Viruses

- **Introduction tobiochemistry: 2 credits (30 hours); L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plants and animal production and technology

1. Proteins, Amino Acids, And Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. The Enzymes
6. Introduction to Metabolism
7. Energy Transfer Process
8. Metabolism of Carbohydrates
9. Metabolism of Lipids
10. Metabolism of Nitrogen Compounds
11. Protein Synthesis and Gene Action
12. The Control of Metabolic Activities
13. Special Biochemistry of Higher Organisms

❖ APT 112: Mathematics/ Farming Systems

- **Mathematics : 3 credits (45 hours); L, T, P, SPW**

Objective: Atthe end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

Course content

1. **Importance of agricultural mathematics to students**
2. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
3. **Use of measures on the farm**
   - Linear measures
   - Square measure (area)
   - Cubic measure (volume)
   - Square roots
4. **Weights and their use**
5. **Trigonometric calculations**
6. **Measurement conversions**

- **Farming Systems: 2 credits (30 hours); L, T, P, SPW**

Objective: At the end of this course, student should have knowledge on various farming systems and be able to choose adequate system for a given agricultural situation.

Course content

1. Definition of concepts
2. Classification of farming systems
3. Farming systems in the tropics
4. Mixed farming systems
5. Intensive farming
6. Intensive livestock
7. Cultural techniques
   - Land preparation and crop establishment
   - Propagation and nurserytechniques
   - Weed control
   - Light and spacing
   - Farming practices and major crops in the tropics

❖ APT 113: Introduction to Agriculture/ Introduction to Soil Science

- **Introduction to Agriculture**: **3 credits (45 hours); L, T, P, SPW**

Objective: Students should be equipped with a broad basic knowledge of Agriculture as a science, and be able to tackle the various disciplines involved in the study of Agriculture.

Course content

1. Definition of Agriculture
2. Introduction to crop production
3. Introduction to animal production
4. Introduction to factors of production
5. Introduction to pests and pest management
6. Introduction to horticulture

- **Introduction to Soil Science**: **2 credits (30 hours); L, T, P, SPW**

Objective: At the end of this course, students should be equipped with knowledge and/or skills on various soil properties and be able to identify a soil suitable for agriculture.

Course content

1. Definition of a soil
2. The composition of a soil
   - Mineral matter
   - Organic matter
3. Soil types (classification of the soil according to the texture)
4. Soil profile
5. Soil organisms
6. Soil air
7. Soil water
8. Water table
9. Loss of water from the soil
   - Transpiration
   - Evaporation
10. Soil temperature

❖ APT 114: Agricultural Economics / Food and Human nutrition

- **Agricultural Economics**: **2 credits (30 hours); L, T, P, SPW**

Objective: To permit the trainees to master the knowledge in the subject matter of economic mechanism and to understand the agro-pastoral production problems in Cameroon

Course content

1. **Introduction**
2. **Some elements of rural sector**
   - Basic features of rural sector
   - Role of agriculture in the national economy
3. **Mode of production**
4. **Systems of cultivation and land tenure**
   - Classification of types of land
   - Land tenure system
   - Land holdings arrangement

- Subsistence agriculture
- Shifting cultivation system

5. **Demand and Supply of agricultural products**
   - Demand of agricultural products
     - Law of demand
     - Demand function
     - Elasticity of demand
   - Supply of agricultural products
     - Law of supply
     - Supply function
     - Elasticity of supply
6. **Production theory**
   - Factors of production and production function
   - Analysis of production relationship
     - Factor-product relationship
     - Factor-factor relationship
     - Product-product relationship

- **Food And Human Nutrition**: **2 credits (30 hours); L, T, P, SPW**

Objective: Upon completion of this course, you will be able to do the following:

- Provide an overview of the major macro and micronutrients relevant to human health.
- Discuss the scientific rationale for defining nutritional requirements in healthy individuals and populations, with reference to specific conditions such as pregnancy, lactation, and older age.
- Present current evidence for the role of key nutrients in the prevention of chronic diseases.

Course content

1. Dietary sources, intake levels, physiological role, and requirement of major nutrients.
2. The biological determinants of nutrient requirements and the assessment of nutrient status in individuals and populations.
3. The role of nutrition in growth and health through the life cycle.
4. The rationale for the development of dietary guidelines and of nutrition policies in different countries.
5. The role of diet in the development of chronic diseases, such as cardiovascular disease, cancer, diabetes, etc.

❖ APT 115: Agrostology / Animal Breeding and Genetics

- **Agrostology: 2 credits (30 hours); L, T, P, SPW**

Objective: To permit the students to master the knowledge necessary to recognize the principal grains and legumes, to judge the nutrient value of a pastureland and control the presence of toxic plants in rangelands

Course content

1. **Chapter 1: Notions of botany**
   - Definitions
   - Morphology and physiology of plants
     - Anatomy of plant and trees
     - Meiosis
     - Carbon cycle
     - Nitrogen cycle
     - The food chain
   - Elements of taxonomy
     - Methods of classification
     - Characteristics of the large groups of forage plants
       - Grasses
       - Legumes
       - others
2. **Chapter 2: The different types of natural pastures in Cameroon**
   - Generalities
   - The sahelian pastures
   - Sudannian pastures
   - Guinean pastures
   - Aerial pastures
3. **Chapter 3: Notion of pasture exploitation**
   - Summary description of techniques
   - Evolution of a pasture
     - Drought
     - Bush fires
     - Estimation of carrying capacity
   - Summary description of amelioration methods
4. **Chapter 4: Principal grasses and legumes**
   - Identification, localization and usage
   - Grasses:
     - Cenchrus ciliaris
     - Chloral gayana
     - Cynodon plectostachyus
     - Brachiaria ruziziensis
     - Brachiaria brisantha
     - Panicum maximum
     - Pennisetum purpureum
     - Pennisetum clandestinum
     - Trypsacum laxum
   - Legumes:
     - Centrosema pubescens
     - Lablab purpureum
     - Pueraria phaseoloides
     - Stylosanthes humilis
     - Medicago sativa
     - Trifolium pratense

5. **Chapter 5: Description of principal toxic plants**
    - Spondiatus preussi
    - Europatorium odoratum
    - Cassava
    - Sorghum
    - Cotton
    - Ricinus communis
    - Sarmentosis strophantus
    - Gloriosa superba
    - Pennisetum clandestinum

- **Animal Breeding and Genetics: 2 credits (30 hours); L, T, P, SPW**

Objectives

- Explain genetic influence on the characteristics exhibited by animals.
- Explain the factors that interact with genes to produce nonconformity in animals.
- Develop procedures to select animals for a breeding program.
- Develop an animal straight breeding program.
- Develop an animal cross breeding program.
- Explain the commercial methods used to breed farm animals.

Course content

1. **Introduction to Genetics**
    - Animal cells
    - Cell division – mitosis (asexual reproduction); meiosis (sexual reproduction)
    - Genes – phenotype and genotype; homogenous and heterogenous
    - Terminology
    - The work of Mendel
    - Sex determination

2. **Genetics**
    - Gene mutations
    - Lethal genes
    - Effect of the environment
    - Hybrid vigour
    - Genetics in agriculture
    - Heritability
3. **Selection**
    - Animal breeding programs
    - Dual purpose animals
    - Artificial selection
    - Gene groups
4. **Pure Breeding**
    - Inbreeding – close breeding and line breeding
    - Genetic effects of inbreeding

- Advantages and disadvantages

5. **Introduction to Cross Breeding**
   - The effects of cross breeding in farm animals
   - Genetic effects, phenotype effects, heterosis, and genotype effect
   - Cross breeding in sheep
   - Cross breeding in domestic animals
6. **Cross Breeding**
   - Practical cross breeding
   - Two breed or single cross
   - Back cross or crisscrossing
   - Cyclical crossing
   - Rotational crossing
   - Advantages of cross breeding
   - Reciprocal recurrent selection
   - Breed societies
   - Grading up
7. **Livestock Improvement**
   - Performance Testing
   - Sib Testing
   - Progeny testing
   - Relative breeding Values (RBV)
   - Artificial insemination
   - Synchronised heats
   - Ova transplants

❖ APT 116: Farm Mechanization / Farm Practice 1

- **Farm Mechanisation: 2 credits (30 hours); L, T, P, SPW**

Objective: At the end of this course, the student should be equipped with knowledge on farm machineries and the ability and skills on rational use of these machineries and equipment for an optimal crop and animal production.

Course Content

1. **Part 1: Farm Tractors**
   - Selecting tractors
   - Operating tractors
   - Understanding the fundamental principles of tractor engines
   - Tractor maintenance
2. **Part 2: Field Machinery**
   - Selecting field machinery
     - Cultivation machinery
     - Drills
     - Manure and fertiliser distribution machinery
     - Sprayers
     - Machinery for haymaking
     - Machinery for silage making

- Balers
- Combine harvesters
- Root crop machinery
- Farmyard machinery
- Farm power

3. **Part 3: Animal draught**

➢ **Farm Practice 1 : 2 Credits (30 Hours); L, T, P, Spw**

Objective: This course will enable the students to carry out practical work in the collective and/or individual plots.

Course content

1. Land preparation
2. Nursery
3. Field planting and maintenance
4. Manuring
5. Harvesting
6. Animal feed production
7. Animal feeding
8. Animal care

❖ APT 117: Bilingual Training

➢ **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ APT 121: Statistics and Probabilities

- **Statistics and Probabilities: 4 credits (60 hours); L, T, P, SPW**

Objective:
Students will learn relevant statistical tools and techniques to collect, analyse and present data

Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

Course content

1. **Introduction**
   - Definition
   - Why study statistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Other numerical measures
5. **Simple linear regression and correlation**
   - Introduction
   - Some definition
   - Scatter diagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ APT122: Principles of Environmental Science / Agro-Climatology

- **Principles of Environmental Science:3 credits (45 hours); L, T, P,SPW**

Objective: This course provides the student with an overview of issues of environmental concerns. It introduces the concept of sustainable development and cultivates concern for environmental stewardship. The student should acquire scientific understanding of the impact of human activities on degrading the environment.

Course content

1. Definition of terms

2. How the environment has changed overtime and the effects on plants and animals
3. A review of some current environmental topics of local and global concern such as population growth, loss of biodiversity, degradation of soils, climate change, pollution, waste management, environmental health
4. A review of the four key environmental elements: water, air, earth and fire
5. A general notion of Environmental Impact Assessment (EIA) and a consideration of law and the environment.

- **Agro-Climatology: 2 credits (30 hours); L, T, P, SPW**

Objectives: To enable students diagnose farming problems and find appropriate solutions.
To equip the students with knowledge of the physical forces and dynamic elements of weather and climate as they affect agricultural production especially within the tropical regions with which the students are familiar.

Course content

1. General knowledge of meteorological elements and their measurements-temperature, rainfall, humidity, atmospheric pressure, sunlight, evaporation, wind direction, wind speed etc.
2. Field trip to a meteorological station to observe the functioning of the instruments cited above.
3. Composition and structure of the atmosphere.
4. General knowledge of climate and climate zones.
5. Climate factors: latitude, altitude, distance from the sea, ocean currents etc with reference to their importance to agriculture.
6. Knowledge on phonology (periodic occurrence) with respect to changes in behaviour – flowering, budding, fruiting, ripening etc.

❖ APT 123: Animal Anatomy And Physiology / Animal Nutrition

- **Animal Anatomy and Physiology : 2 credits (30 hours); L, T, P, SPW**

Objective: To study the anatomy (structure) and physiology of various organ systems of domestic animals.

Course content

1. Anatomical details that distinguish each species and their effects on the biology, physiology and pathology of each species of domestic animals
2. Locomotion, digestion, respiratory, urinary, genital and defence apparatus
3. Skeletal structure, muscles, coat cover (skin, hair, wool, plumage)
4. Products (meat, milk, eggs, by-products)

5. Moulting, hair eating and feather picking.
6. Animal cell
7. Blood and circulatory system

- **Animal Nutrition: 2 credits (30 hours); L, T, P, SPW**

Objective: The Unit has three fundamental objectives. The first is to provide the students with knowledge on feed composition, their digestion processes, and nutrient metabolism. The second objective is for the student to learn to evaluate the nutritional value of the different feed components, through the application of various systems. The third objective is to provide the student with the necessary knowledge and techniques to evaluate the animal's nutrient requirements in the different growth and production stages and to estimate, control and predict feed intake.

Course content

1. **Feed composition, nutrient digestion and metabolism**
   - Chemical composition and physical properties of feed components
   - Microbiology of the digestive tract: ruminants and monogastrics
   - Comparative digestion: processes, end products and efficiency
   - Intermediate metabolism: gut and liver
   - Tissue metabolism: bones, muscle, adipose tissue, reproductive tract and mammary gland
   - Nutrigenomics
2. **Feed evaluation**
   - Energy evaluation systems
   - Protein evaluation systems
   - Mineral and vitamin availability
3. **Nutrient requirements**
   - Estimation and expression of nutrient requirements
   - Nutrient balance and body reserves
   - Maintenance, activity and thermal regulation
   - Growth and development
   - Reproduction, pregnancy and lactation
4. **Feed intake**
   - Control mechanisms
   - Estimation methodologies
   - Variation factors
5. **Case studies**
6. **Practicals**

❖ APT 124: Principles of Seed Technology / Principles of Crop Protection

- **Principles of Seed Technology: 2 credits (30 hours); L, T, P, SPW**

Objective: To enable students' future farmers/entrepreneurs understand the basic principles of producing planting materials, the technologies involved, management and marketing.

Course content

1. **Introduction**
   - Objective
   - Importance of seeds in Agriculture.
   - Generalities and classification of seeds
2. **Part 1: Sexual reproduction**
   - Principles of plant reproduction
   - Definition of key words used in plant reproduction
   - Selection and Breeding
   - Choice of Quality seeds
   - Seed drying and storage
   - Sowing-Nursery-Transplanting
   - Germination Test
   - Notion of Dormancy
   - Vitality of seeds
3. **Part 2: Assexual reproduction or vegetative reproduction**
   - Different methods of vegetative propagation
     - Cutting
     - Layering
     - Budding and Division
     - Grafting
   - Biotechnology and seed production:
     - Plant cell and tissue culture

- **Principles of Crop Protection: 2 credits (30 hours); L, T, P, SPW**

Objective: Students should be equipped with general knowledge and/or skills on pests and diseases of cultivated crops and their management.

Course content

1. **Principles of Pest and Disease control**
   - Pests
     - Definition of pests
     - Classification of plant pests
     - Pest damage to crop plants
   - Diseases
     - Definition of plant disease
     - Classification of plant disease
     - Causes of plant disease
     - Development of disease in a crop
     - Life cycle of the pathogen
     - Epidemiology
   - Control of pests and disease
     - Non-chemical methods
     - Chemical control
     - The concept of integrated pest management (IPM)
     - Chemicals used to control plant pests and diseases

- Formulation
- Persistence
- Nomenclature of pesticides

– Method of application of pesticides
  - Application to soil
  - Application to seed
  - Application to crops
– Equipment for application of pesticides
– Efficient and safe use of pesticides.

❖ APT 125: Industrial Crop Production / Farm Practice 2

➢ **Industrial Crop Production: 2 credits (30 hours); L, T, P, SPW**

Objective : The student should be able to understand the production, technology and management of fibre, latex, and sugar crop of Cameroon; He or she should have the ability to produce each of them.

Course content

1. **The following crops shall be studied:**
   - Cotton
   - Rubber
   - Sugar cane
   - Oil palm
   - Tea, etc….
2. **Each crop shall be studied under the headings given below:**
   - Origin and distribution
   - Uses
   - Botanical description and classification
   - Ecology
   - Propagation
3. **Nurseries**
4. **Budding or grafting**
   - Crop husbandry
   - Land preparation
   - Planting
   - Fertilization
   - pruning
   - Protection
   - Weed control
   - Pest control
   - Harvesting

➢ **Farm Practice 2: 2 credits (30 hours); L, T, P, SPW**

Objective: This course will enable the students to carry out practical work in the collective and/or individual plots.

Course content

1. Land preparation
2. Nursery
3. Field planting and maintenance
4. Manuring
5. Harvesting
6. Animal feed production
7. Animal feeding
8. Animal care.

❖ APT 126: Internship 1

- **Internship 1 : 6 Credits (90 Hours); P, SPW**

Objective: The objective is to enable the student understand and be used to the rural environment in which he might work upon the completion of his training.

Course content

During the month of August, each student will carry out the study of one village of his choice and will produce at the end, a report including the following topics:

1. The history of the village
2. The physical feature of the village (village landscape, pedology, climate, etc.)
3. Village agriculture and economy
4. Diagnosis of village problems and proposal of solutions

❖ APT 127 : Civic and Ethical Education

- **Civic and Ethical Education: 3 credits (45 hours); L, T, P, SPW**

Course content

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. The universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services

10. Human qualities
11. Some moral figures through national and foreign history

❖ APT 231 : Agricultural experimentation and Designs/ Post Harvest Technology

- **Agricultural Experimentation And Designs: 2 Credits (30 Hours); L, T, P, SPW**

Objective: Students should acquire an understanding of experimental designs, quantitative methods of research and be able to use them adequately.

Course content

1. Background information on statistics
2. Sampling techniques
3. Introduction to experimentation and experimental designs
4. Analysis of variance
5. Mean separation
6. On-farm research

- **Post Harvest Technology: 2 credits (30 hours); L, T, P, SPW**

Objective: By the end of the course, students should be able to:

- Describe the processes/factors that result in quality deterioration and loss of harvested produce
- Explain technologies/procedures applied to improve quality and reduce losses of harvested produce.
- Discuss quality attributes and standards required to maintain safety of harvested produce

Course content

1. **Introduction**
   - Background
   - Definition of terms
   - Importance of Postharvest Technology
   - Comparison between perishable and non-perishable crops

2. **Value of crops and their losses**
   - Value of harvested crops
   - The Postharvest Food Pipeline:Stages at which crop losses occur
3. **Factors causing Postharvest Losses**
   - Preharvest factors
   - Biological factors (Physiological factors, insect pests)
   - Environmental factors
4. **Postharvest Technology Procedures**

- On-farm (Primary) processing technologies
- Storage technologies for primary processed products
- Technologies for management of perishable produce

5. **Harvesting and Quality Requirements for Perishable and Non-perishable Crops**
   - Maturity and indices
   - Parameters used to describe quality of commodities
   - Grade standards and inspection
   - Mechanical and Hand harvesting
   - Preparation of produce for the Fresh market
   - Packaging and packages for fresh produce

❖ APT 232 : Farm and Resource Management / Soil and Water conservation

➢ **Farm and Resource Management : 3 credits (45 hours); L, T, P, SPW**

Objective: At the end of this course, students should be able to conduct farm activities, choose better alternative and conceive long or short-term production planning.

Course content

1. **Scope and nature of Farm Management**
   - Introduction
   - Scope of Farm Management
   - Principles of Farm Management
   - Business objectives
   - Business areas to be managed
2. **Decision making**
   - Steps in achieving management objectives
   - Planning and control
   - Managerial effectiveness
3. **Farm business organizations**
   - Subsistence farming
   - Differences between Subsistence farming and Commercial farming
   - Risks and Uncertainties in agriculture
   - Types of risks and ways of checking risk effects in agriculture (precautions)
4. **Management tools and farm planning**
   - Farm records and accounts
     - Types of farm records and accounts
     - Uses of farm records and accounts
     - Importance of farm records and accounts
   - Farm budgeting
     - Advantages of budgeting
     - Types of budgeting

- Budgeting procedure
- Depreciation

5. **Farm accounting systems**
6. **Farm valuation**
   - Approaches of farm valuation
   - Basis of valuation
7. **Farm accounting statement**
   - Balance sheet
   - Income statement
   - Cash flow statement

- **Soil and Water Conservation: 2 credits (30 hours); L, T, P, SPW**

Objective: A the end of the course, the students are expected to have knowledge and skills on the main techniques of controlling erosion and other soil degradation factors.

Course content

1. **Soil erosion**
   - Erosion caused by water
   - Erosion caused by wind
   - Stream bank erosion
2. **Soil conservation (agronomic measures to control erosion)**

❖ APT 233: Cattle Production / Pig Production

- **Cattle Production: 2 credits (30 hours); L, T, P, SPW**

Objective: the student should be equipped with knowledge, skills, and techniques of cattle production and management**.**

Course content

1. **Selecting the breeding herd**
2. **Definition of common cattle terminology**
3. **Physiology of reproduction**
4. **Artificial insemination**
5. **Developing dairy calves and heifer**
6. **Beef production**
7. **Milk production**
8. **Cattle breeding**
9. **Selecting and developing breeding dairy cattle for profit**
10. **Ageing**
11. **Establishing the breeding herd**
12. **Care and management of the breeding herd**
13. **Stocker and feeder cattle production**

14. **Reproduction in dairy cattle**
15. **Beef cattle housing and handling equipment**
16. **Nutrition and feeding (Digestion and utilization of food)**
    - Anatomy and physiology for beef cattle
    - Digestion of food
    - Absorption of nutrients
17. **Rations for beef cattle**
    - Preparation of feeds
    - Manner of feeding
    - Fattening cattle on pasture
    - Ration of beef cattle
    - Formulating rations
    - Feeding additives
    - Implants for beef cattle
18. **Keeping beef cattle healthy**
    - Control of parasites
    - Control of diseases
19. **Beef cattle selection**
    - The beef carcass
    - Slaughtering process
    - Carcass grades and grading
    - Beef by-products
20. **Raising and managing dairy heifers**
    - Building up the dairy herd
    - Handling the dairy herd
    - Raising the dairy calf
    - Feeding the dairy herd
    - Controlling parasites and diseases
    - Milk production
    - The farm milk house
    - The dairy barn
    - Marketing dairy products
    - Keeping records of the dairy
    - Finishing of fattening
    - Nutrition and feeding
    - Rations for beef cattle
    - Beef cattle selection
    - The beef carcass
    - Slaughtering process
    - Beef by-products

- **Pig Production : 2 credits (30 hours); L, T, P, SPW**

Objective: the student should be equipped with knowledge, skills, and techniques of pig production and management**.**

Course content

1. General considerations about the pig port as human food
2. Breeding and selection
3. Prenatal development
4. Postnatal development
5. Growth
6. Reproduction
7. Lactation
8. Feeding and nutrition
9. Feed stuff and Morden feed formation
10. Energy source for swine
11. Protein source
12. Mineral and vitamin and non-nutrition
13. Feed additive
14. Processing and its effects on nutritive value
15. Control of diseases
16. Nutritive disorder and toxic substances
17. Environmental physiology
18. Swine management and marketing

❖ APT 234: Cereal Production / Root And Tuber Production

- **Cereal Production: 2 credits (30 hours); L, T, P, SPW**

Objective:

The student should be able to understand the production, technology and management of each of the cereal crops of Cameroon. He or she should have the ability to produce each of these cereals.

Course content

1. **The following cereals shall be studied:**
   - Maize
   - Sorghum
   - Rice
   - Wheat
   - Millet
2. **Each cereal shall be studied under the headings given below:**
   - Origin and distribution
   - Uses
   - Botanical description and classification
   - Ecology
   - Propagation
   - Crop husbandry
     – Land preparation

  - Planting
  - Fertilization
- Protection
  - Weed control
  - Disease control
  - Pest control
- Harvesting
- Processing and storage

➢ **Root And Tuber Production: 2 credits (30 hours); L, T, P, SPW**

Objective :

- The student should be able to understand the production, technology and management of each of the main root and tuber crops of Cameroon
- He or she should have the ability to produce each of these roots and tubers.

Course content

1. **The following roots and tubers shall be studied:**
   - Cassava
   - Yams
   - Potato
   - Cocoyam
   - Sweet potato
2. **Each crop shall be studied under the headings given below:**
   - Origin and distribution
   - Uses
   - Botanical description and classification
   - Ecology
   - Propagation
   - Crop husbandry
     - Land preparation
     - Planting
     - Fertilization
   - Protection
     - Weed control
     - Disease control
     - Pest control
   - Harvesting
   - Processing and storage

❖ APT 235: Sheep and goat production / Poultry production

➢ **Sheep and Goat Production: 2 credits (30 hours); L, T, P, SPW**

Objective: the student should be equipped with knowledge, skills, and techniques of sheep and goat production and management**.**

Course content:

A. Sheep

1. Classes and breeds of sheep
2. Breeds and breed characteristics
3. Selecting and establishing the breeding fleck
4. Conditions to consider before starting a flock
   - Selecting the breed
   - Selecting foundation stock
5. Selecting feeder lambs
   - Classes and grades of feeder sheep and lambs
   - Selecting the weight and grade of feeder lambs
6. Feeds and feed utilization
   - The digestion system of sheep
   - Digestion process of young lambs and older animals
7. Balancing the ration
8. Measuring the value of feeds
9. Quality of feeds
10. Commercial mixed feeds
11. Feeding the breeding flock
12. Feeding the ewes during gestation
13. Feeding ewes that are sucking lambs
14. Feeding the breeding rams
15. Feeding lambs
16. Management of the breed flock
17. Heat period, gestation and breeding seasons
18. Preparing the ewe and ram for breeding
19. Ewe-ram ratio and age of ram
20. Planning the lambing season and age to breed ewe
21. Management of the new born lambs
22. Management of growing lambs
23. Shearing sheep
24. Shelter and equipment for sheep
25. Reproduction, inheritance, and breeding system in sheep
26. Keeping sheep healthy

B. Goat

1. Classification, distribution, and importance of domestic goat
2. Genetic improvement
3. Meat production
   - Reproduction
   - Growth rate
   - Feed conversion
   - Carcass characteristics

4. Milk production
5. Milk composition
6. Length of lactation and lactation curve
7. Level and efficiency of milk production
8. Fibre production
9. Husbandry
    - Size and structure of herds
    - Behaviour
    - Reproductive management
10. Herding and fencing
11. Control of diseases

- **Poultry Production: 2 credits (30 hours); L, T, P, SPW**

Objective: the student should be equipped with knowledge, skills, and techniques of poultry and rabbit production and management**.**

Course content

1. Poultry breed and breeding selection and culling
2. Poultry nutrition and feeding
3. Poultry housing and equipment
4. Poultry health, diseases prevention, and parasite control
5. Specialized poultry production
6. Poultry management
7. Business aspect of poultry production
8. The egg
9. Marketing poultry and eggs

❖ APT 236: Soil fertility and plant nutrition / Fruit and vegetable production

- **Soil Fertility and Plant Nutrition: 2 credits (30 hours); L, T, P, SPW**

Objective: At the end of the course students should be able to determine the essential characteristics of a natural fertility; in case of a poor or low soil fertility, they should be able to put in place agricultural techniques to boost the fertility of the soil.

Course content

1. Nutrients functions of soil supplied elements and deficiency symptoms
2. Organic manure
3. Inorganic fertilizers
4. Form of fertilizer available
5. Fertilizer placement
6. Fertilizer recommendations (calculating product used from recommendations)

7. Liming
8. Soil fertility and biotic factors
9. The decomposition of organic matter
    - Aminization
    - Nitrification
    - Ammonification
    - Nitrogen fixation

- **Fruit and Vegetable Crop Production: 3 credits (45 hours); L, T, P, SPW**

Objectives:

- The student should be able to understand the production, technology and management of each of the main fruit and vegetable crops of Cameroon
- He or she should have the ability to produce each of them.

Course content

1. **The following fruit and vegetable crops shall be studied:**
    - Bananas
    - Pineapple
    - Citrus
    - Mango
    - Avocado pear
    - Common vegetable crops
2. **Each crop shall be studied under the headings given below:**
    - Origin and distribution
    - Uses
    - Botanical description and classification
    - Ecology
    - Propagation
        - Nurseries and nursery maintenance
        - Budding, grafting
    - Crop husbandry
        - Land preparation
        - Planting
        - Fertilization
        - pruning
    - Protection
        - Weed control
        - Disease control
        - Pest control
    - Harvesting
    - Processing and storage

❖ APT 237: Business Law

- **Business Law:3 credits (45 hours); L, T, P, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, distribution law, and intellectual property law. Students are equally expected to understand the rules and legal provisions regarding the internal and external operations of a corporate body including the powers of executives.

Course content

1. **Banking Law**
   - Fundamental principles of banking law
   - Bankers/customer relationship
   - The bankers lien
   - Direct debts and credits
   - Guarantees and securities
   - Negotiable instruments
2. **Law of Taxation**
   - Fundamental principles of taxation law fiscal and customs reforms within the CEMAC
   - Methods of tax imposition on companies
   - Types of tax regulation
3. **Insurance law**
   - Fundamental principles
   - Insurance interest
   - Utmost good faith (misrepresentation and non-disclosure
   - Indemnity contribution and subrogation
   - Proximate course
     - Agents and brokers
     - Settlement of insurance claims
     - Application of the CIMA code
4. **Law of Arbitration**
   - Notion of arbitration
   - Other alternatives teachings in resolving conflicts mediation, conciliation and reconciliation
   - Arbitration agreements
   - Arbitration tribunal
   - Proceedings
   - Awards, recognising, enforcing and resisting awards
   - Applicable laws
   - Impact of the OHADA treaty
5. **Intellectual property law**
   - World intellectual property organisation (WIPO) Treaties and their implementation

- Patent law
- Design law
- Trade and service marks law
- Copy right law
- Complete and technology law: fundamentals of computer contracts, computer trands and hacking.
- Other (National or international) Intellectual property organisation.

❖ APT 241: Agricultural Marketing

- **Agricultural Marketing:5 credits (75 hours); L, T, P, SPW**

Objectives: At the end of this course, students should be able to:

- Understand the role of marketing in the economy;
- Predict consumer's wants or preferences;
- Anticipate and satisfy demand (needs) profitably in markets.

Course content

1. The environment of marketing
2. Approaches to analyse marketing problems
3. Market organisation
4. Supply and demand of agricultural products
5. Structure, conduct and performance of a market
6. Selling of agricultural products
7. General problems of agricultural commercialisation

❖ APT 242: Agroforestry

- **Agroforestry:4 credits (60 hours); L, T, P, SPW**

Objective: To enable students diagnose farming production problems and find appropriate solutions economically and ecologically sound for the promotion of natural resources and environment.

Course content

1. Chap 1: Historic- concepts and Principles of Agroforestry
2. Chap 2: Agroforestry components and Interactions
3. Chap 3: Agroforestry Techniques and Systems.
4. Chap 4: Dangers of Agroforestry and their Palliatives.
5. Chap 5: Socio Economic Aspects of Agroforestry.
6. Chap 6: Developing Agroforestry Interventions.
7. Chap 7: Agroforestry Extension.

❖ APT 243: Parasitology / Pesticide application and Management

- **Parasitology: 3 credits (45 hours); L, T, P, SPW**

Objective: To permit the veterinary nurses to acquire the knowledge and master diseases provoked by internal and external parasites.

Course content:

1. **Chapter 1: Generalities**
   - Definition
   - Classification of parasites
   - Classification of host
   - Routes of transmitting the parasites
   - Direct pathogenic effects
   - Indirect pathogenic effects
   - Factors influencing epidemiology
   - Self cure
2. **Chapter 2: Parasitic diseases**
   - The gastro-intestinal tract
   - Respiratory system
   - Urinary system
   - Skin and subcutaneous tissue
   - Circulatory system
   - Muscles and ligaments
   - Nervous system
   - The eye
   - Reproductive system

- **Pesticide Application and Management: 2 Credits (30 Hours); L, T, P, SPW**

Objective: To give the trainees the ability and skills to efficiently use pesticides and equipment to control pests

Course content

1. **Chemicals used to control plant pests**
   - Formulation
   - Persistence
   - Nomenclature of pesticides
2. **Methods of application of pesticides**
   - Application to soil
   - Application to seed
   - Application to crops
3. **Equipment for application of pesticides**
4. **Efficient and safe use of pesticides**

❖ APT 244: Principles of aquaculture / Agricultural extension education

- **Principles of Aquaculture: 2 credits (30 hours); L, T, P, SPW**

Objectives:
Describe the historical and current state of aquaculture in the world
Describe the basic physical-chemical parameters of water that are relevant to aquaculture
Explain current culture systems and associated basic engineering aspects
Characterize the biology and culture of 8 major groups of cultured aquatic organisms
Explain basic reproductive physiology and the application of genetic tools to aquaculture
Identify the important macro and micro nutrients relevant to fish nutrition and feed formulation
States the main factors related to aquatic health and disease and their interplay
Describe the main economic, legal and social contexts associated with aquaculture
Discuss the various point of views related to aquaculture environmental impacts and sustainability

Course content

1. Key Chemical and physical processes in aquaculture systems
2. Aquaculture production systems
3. Culture of fish
4. Vertebrate Reproduction
5. Invertebrate reproduction
6. Breeding systems and genetics
7. Aquaculture products
8. Culture of Invertebrates
9. Culture of seaweeds
10. Minimising environmental impacts
11. The future of aquaculture

- **Agricultural Extension Education: 2 credits (30 hours); L, T, P, SPW**

Objective:

- To equip Agriculture trainees with knowledge and skills that will enable them to help farmers identify, analyse and deal with their production problems.
- Discuss the principles and practices of agricultural extension and communication and their relevance to sustainable agriculture and development
- To equip trainees with skills and techniques that will enable the rural community identify and address their own problems.

Course content

1. Introduction
2. Principles and Approaches of Extension Work

3. The Agriculture Extension Agents
4. Social Change and Innovation
5. Gender In Extension
6. Community Participation in Rural Development
7. Extension Monitoring Systems

❖ APT 245: Principles of food technology / Food processing and preservation

- **Principles of Food Technology: 2 credits (30 hours); L, T, P, SPW**

Objective: The aim of the course is to introduce students to the main principles of technology and its implementation in the food industry. The course covers the basic principles and practices of the major techniques used in food processing and preservation along with critical issues in food regulations and nutrition

Course content

1. Principles of food processing and preservation techniques.
2. Properties and relationships (chemical/ physical) of major food constituents and of the biohazards those are important in food processing with regard to product quality in the food industry.
3. Nutritional properties of food constituents.
4. Principles and importance of cleaning and sanitation in food process operations.
5. Impact of water and waste management in the Food Industry
6. Ethical considerations in food production, processing and marketing in relation to the consumer.

- **Food Processing and Preservation: 2 credits (30 hours); L, T, P, SPW**

Objective: To introduce the principles of the manufacturing processes and technologies used in the production of food products and the preservation issues associated with food quality and safety in food production.

Course content

1. Principles and processes of canning, freezing, dehydrating and fermentation of foods;
2. The use of salt, sugar and additives to preserve food;
3. The importance of food packaging.
4. Food manufacturing processes in the fish, meat, fruit and vegetable, cereal, dairy, beverage and confectionery industries.

5. Principles and techniques of proper handling and preservation of products in these industries. Ingredients such as sweeteners, flavourings, colouring and preservatives.

❖ APT 246: Internship 2

- **Internship 2 : 6 credits (90 hours); L, T, P, SPW**

Objective: The internship 2 is a one to two month internship in an agro-pastoral enterprise. At the end of this period, the trainee should be able to analyse the functioning of the enterprise, come out with a problem faced by the enterprise and propose possible solutions to the problem.

Course content:

1. Presentation of the enterprise
2. History of the enterprise
3. Administrative and technical organisation of the enterprise
4. Activities of the enterprise
5. Socio-economic analysis of the enterprise
6. Problems and solution proposals

❖ APT 247: COMPUTER FOR BUSINESS

- **Computer for Business:3 credits (45 hours); L, T, P, SPW**

Objective: At the end of the course, the student should be able to:

- Know related computing concepts ;
- Have practical hands on using computers.

Course content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current notions e.g., information society and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Conceptual (abstract) view/layout of problem handled be given packages, optional packages, presentation graphics and graphing packages;

8. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services; e-commerce, mention assorted internet related protocols and standards e.g. http, ftp, html.
9. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;

The Minister of Higher Education

Pr Jacques FAME NDONGO

Field : ENVIRONMENTAL SCIENCES

Specialty :

AGRO-FORESTRY AND FOREST MANAGEMENT

Field: ENVIRONMENTAL SCIENCES

Specialty: Agro-Forestry and Forest Management

1. The objective of the training

Training students in Agro-forestry and forest management serves to ensure newness of green fuel wood, soil fertility, the carbon/nutrient cycle, they also serve to diagnose farming production problems and find appropriate solutions which are economically and ecologically sound for the promotion of natural resources and environment.

2. Skills sought after

→ **Generic Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knowledge in:
Agroforestry Ecology; Meteorology and Hydrology; Forest Plant Taxonomy; Agriculture and Forestry Varieties; Agriculture System; Soil science; Agriculture and Forestry Survey and Planning; Aquaculture; Industrial Crops; Food Plants; Fruit-tree/Fruit Plants; Plantation Techniques; Agroforestry Products Harvesting and Processing; Livestock and Poultry Breeding; Forestry Entomology and Pathology; Agroforestry Techniques; Plant Physiology.

→ **Specific Skills**

- Develop appropriate agroforestry technologies for more sustainable management
- Recognise the principal grains and cereals;
- Apply standard silvicultural techniques in managing forest for sustainable development;
- appreciate the principles of tree development;

- Identify mature trees for logging and the method to ensure proper logging;
- Appreciate energy and nutrient flow in a terrestrial system;
- Appreciate the importance of using appropriate method during logging;
- Apply survey techniques in agroforestry;
- Protect against fire encroachment and illegal felling;
- Prepare and didacticsaids in agroforestry;

3. Career opportunities

- Disseminators of agroforestry technologies to communities;
- Technicians in the Ministry of Forestry and Wild Life and the Ministry of the Environmentalist and Nature Protection;
- Personal initiative as cooperative or NGO's promoting sustainable natural resource use.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		Specialty: Agro-Forestry and Forest Management					
Course Code	Course titles	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGF111	Mathematics/Statistics	30	20	5	5	60	4
AGF112	Biochemistry	30	20	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGF113	Silviculture	20	15	20	5	60	4
AGF114	Wood Anatomy and Properties	20	15	20	5	60	4
AGF115	Forest Botany	30	20	20	5	75	5
AGF116	Forest Economics	30	20	20	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGF117	Civic education and ethics	30	10		5	45	3
Total		**190**	**120**	**90**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		Specialty: Agro-Forestry and Forest Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGF121	History of forest reform in Cameroon	30	20	5	5	60	5
AGF122	Microbiology	40	10	20	5	75	4
Professional courses 60% (4 UC) 18 credits 270 hours							
AGF123	Forest inventory and mensuration	20	15	20	5	60	4
AGF124	Terrestrialecosystems	20	15	20	5	60	4
AGF125	Non-Ignited Forest Products	30	20	20	5	75	5
AGF126	Agroforestry	30	20	20	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGF127	Bilingual Training	30	10		5	45	3
Total		**160**	**85**	**145**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		Specialty: Agro-Forestry and Forest Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGF231	Rural sociology	30	20	5	5	60	4
AGF232	Forest ecology	40	30		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGF233	Introduction to forest management	30	20	5	5	60	4
AGF234	Aerial and ground survey techniques	30	20	5	5	60	4
AGF235	Training in firearms and ballistics	30	20	20	5	75	5
AGF236	Forest engineering	30	20	20	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGF237	Computer and multimedia	25	10	5	5	45	3
Total		**190**	**110**	**80**	**60**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		Specialty: Agro-Forestry and Forest Management					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
AGF241	Environmental law	30	20	5	5	60	4
AGF242	Certification and sustainable forests	40	25	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
AGF243	Wood processing and utilization	25	10	20	5	60	4
AGF244	Forest protection and logging control	35	15	5	5	60	4
AGF245	Cartography	35	15	5	5	60	4
AGF246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
AGF247	Labour Law		10		5	45	3
Total		**230**	**105**	**35**	**35**	**450**	**30**

5. Courses content

❖ AGF 111: Mathematics/Statistics

- **Mathematics: 2 credits (30 hours); L, T, P, SPW**

Objectives

Atthe end of this course, students will be able to knowledge of mathematics to agricultural production and business decisions.

2. **Importance of agricultural mathematics to students**
3. **Basic arithmetic**
   - Decimals
   - Fractions
   - Percentages
   - Negativenumbers
4. **Use of measures on the farm**
   - Linearmeasures
   - Square measures (area)
   - Cubicmeasures (volume)
   - Square roots
5. **4. Weights and their use**
6. **5. Trigonometriccalculations**
7. **6. Measurement conversions**

- **Statistics: 2 credits (30 hours); L, T, P, SPW**

Objectives:

Students will learn relevant statistical tools and techniques to collect, analyse and present data. Studentsgain knowledge on how to design exploratory and secondary research as well as data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Whystudystatistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **datasets**
   - Introduction
   - Tables
   - Graphics methods of data presentation

4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Othernumericalmeasures
5. **Simple linearregression and correlation**
   - Introduction
   - Somedefinition
   - Scatterdiagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ AGF 112: Biochemistry

- **Biochemistry: 5 credits (75 hours); L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plant and animal production and technology

1. Proteins, Amino Acids, and Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. The Enzymes
6. Introduction to Metabolism
7. Energy Transfer Process
8. Metabolism of Carbohydrates
9. Metabolism of Lipids
10. Metabolism of Nitrogen Compounds
11. Protein Syntheses and Gene Action
12. The Control of Metabolic Activities

❖ AGF 113: Silviculture

- **Silviculture: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Students should master standard silvicultural techniques.

- Students should be able to apply standard silvicultural techniques in managing forest for sustainable development.

    1. Natural forest regeneration
    2. Artificial forest regeneration
    3. Nursery techniques
    4. Taunggyi and other Silviculture techniques

❖ AGF114: Wood Anatomy and Properties

- **Wood Anatomy and Properties: 4 credits (60 hours); L, T, P, SPW**

Objectives

- At the end of the course students should master what constitutes wood
- Identify the different types of wood
    1. Characteristics of wood
    2. Structure and properties
    3. Identification

❖ AGF 115: Forest Botany

- **Forest Botany: 5 credits (75 hours); L, T, P, SPW**

Objective

- Students should appreciate the principles of tree development
- Tree nomenclature
- The interaction of trees and other members of the environment
    1. Morphology of tropical trees
    2. Taxonomy of tropical trees
    3. Ecology of tropical trees

❖ AGF 116: Forest Economics

- **Forest Economics: 5 credits (75 hours); L, T, P, SPW**

    1. **Markets, government, and forest investment analysis**
        - Basic economic questions
        - Forests as economic resources
        - Economic decision making
        - Market economies and the role of government
        - Forest investment analysis
    2. **The forest sector – land, timber, and unpriced forest values**
        - Timber supply, demand, and pricing
        - Unpriced forest values
        - Land allocation and multiple use

3. **The economics of forest management**
   - The optimal forest rotation
   - The stand and the forest
   - Market solutions and limitations
   - Timber harvests over time in the absence of sustained yield policy: market as a regulator
   - Long-term trends in the forest sector and silvicultural investment
4. **Economics of forest policy**
   - Property rights
   - Forest taxes and other charges
   - Forest products trade
   - Global forest resources and the environment

❖ AGF 117:Civic education and ethics

➢ **Civic education and ethics: 3 credits (45 hours); L, T, SPW**

Content:

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ AGF 121: History of forest reform in Cameroon

➢ **History of forest reform in Cameroon: 5 credits (75 hours):L, T, P, SPW**

❖ AGF 122: Microbiology

- **Microbiology: 4 credits (60 hours); L, T, P, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms for plants and domestic animals.

1. Chapter 1: Definition
2. Chapter 2: Classification of microorganisms
3. Chapter 3: Methods of classification
4. Chapter 4: Bacteria
5. Chapter 5: Mycoplasmas
6. Chapter 6: Rickettsiae
7. Chapter 7: Fungi
8. Chapter 8: Viruses

❖ AGF 123: Forest inventory and mensuration

- **Forest inventory and mensuration: 4 credits (60 hours):L, T, P, SPW**

Objectives

- Identification of mature trees for logging
- Identification method to ensure proper logging

1. Forest resource sampling and enumeration techniques
2. Measurement and estimation of timber in log and forest stands

❖ AGF 124: Terrestrial ecosystem

- **Terrestrial ecosystem: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Appreciate energy and nutrient flow in a terrestrial system
- Knowledge the inter-dependence of components of an ecosystem

1. The major terrestrial biomass of West Africa and their ecological features
2. The flow of energy and materials through natural ecosystems
3. The importance of conservation

❖ AGF125:Non-Ignited Forest Products

- **Non-Ignited Forest Products: 5 credits (75 hours); L, T, P, SPW**

❖ AGF 126: Agroforestry

- **Agroforestry: 5 credits (75 hours); L, T, P, SPW**

Objectives: To enable students diagnose farming production problems and find appropriate solutions economically and ecologically sound for the promotion of natural resources and the environment.

1. Historic- concepts and Principles of Agroforestry
2. Agroforestry components and Interactions
3. Agroforestry Techniques and Systems.
4. Dangers of Agroforestry and their Palliatives.
5. Socio Economic Aspects of Agroforestry.
6. Developing Agroforestry Interventions.
7. Agroforestry Extension.

❖ AGF 127: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**

- Vocabulaire des **affaires**

2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ AGF 231: Rural sociology

➢ **Rural sociology: 4 credits (60 hours); L, T, P, SPW**

1. Meaning and definition of sociology and rural sociology.
2. Scope of sociology and rural sociology
3. Importance of rural sociology in forestry extension & interrelationship with forest management
4. Cameroonian rural society and its important characteristics
5. Differences and relationship between rural and urban societies
6. Social Groups meaning and definition, classification of groups
7. Meaning, definition & functions of social stratification
8. Meaning and definition of cultural concepts (Culture, Customs, Folkways, Rituals and Traditions)

9. Meaning and definition of social values and attitudes
10. Meaning and definition of social institutions
11. Meaning, definition and types of social organization
12. Role of social organizations in agroforestry
13. Meaning, definition and need of social control

❖ AGF 232: Forest ecology

- **Forest ecology: 5 credits (75 hours); L, T, P, SPW**

1. Introduction to Forest Ecology
2. Analyses of Changes in Forest Structure and Function at Multiple Time and Space Scales
3. Primary production
4. Water cycle in forest ecosystem
5. Biotic interactions and biodiversity
6. Biogeochemical cycles of nutrients
7. Ecological stability and ecosystem interaction
8. The Role of Forests in Global Ecology

❖ AGF233:Introduction to forest management

- **Introduction to forest management: 4 credits (60 hours); L, T, P, SPW**

Objective

- Master forest administration techniques
- Evaluate their applicability in forest sustainability

1. Organization of forest services
2. Forest production activities
3. Forest protection and regulation of harvest for sustainable yield
4. Preparation of working plan

❖ AGF 234: Aerial and ground survey techniques

- **Aerial and ground survey techniques: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Application of survey techniques in agroforestry
- Photography in agroforestry

1. Ground survey instruments
2. Radial-line plotting and height determination
3. Interpretation of aerial photographs and satellite imagery

❖ AGF235:Training in firearms and ballistics

- **Training in firearms and ballistics: 5 credits (75 hours); L, T, P, SPW**

Objectives

- Use of weapons as a tool to protect forest
- Efficient use and management of weaponry

1. Practical training in handling and use of fire arms and ammunition
2. The care and maintenance of fire arms and ammunition

❖ AGF236: Forest engineering

- **Forest engineering: 5 credits (75 hours); L, T, P, PW**

Objective

- Agroforestry infrastructure and coordination

1. Construction of roads, bridges and other infrastructure in forest operations
2. Planning and supervision of forest engineering operations

❖ AGF237:Computer and multimedia

- **Computer and multimedia: 3 credits (45 hours); L, T, P, SPW**

A- The hardware

1. **The peripheral components**
   - The input devices;
   - The output devices;
   - The storage devices;
   - Input devices and output.
2. **The central unit**
   - The central memory;
   - The microprocessor;
   - The ports;
   - The motherboard;
   - The chipset;
   - The power supply; expansion cards; other internal organs.
3. **The unit of exchange (or bus)**
   - Role;
   - The bus types
     - Data bus;
     - Control bus;
     - Address bus.

B- The software

1. **The application software**
   - Definition;

- Role;
- Types and examples of software.

2. **The basic software (or software systems)**
   - Definition;
   - Types of basic software;
     - The drivers;
     - The compilers;
     - The utilities;
     - The operating systems:
       - Features;
       - Roles;
       - Types of operating system;
       - Structure of a system of exploitation;
       - Architecture;
   - Concept of Free Software and proprietary software.

C- The study of the Graphical Environment Windows

1. Presentation;
2. Management of Windows;
3. Managing Files and Folders.

D- What is a file, a folder?

1. Path to a file. E- study practice of Microsoft Word
2. Study of Basic Functions.

F- Study practice of Microsoft Excel

1. Presentation;
2. Arithmetic operations.

G- Construction of a formula

1. Use of the integrated functions:
   - Definition;
   - Syntax of the integrated functions;
   - A few integrated functions;
2. Relative reference, absolute reference and joint reference;
3. Case of synthesis.

❖ AGF241: Environmental law mensuration

➢ **Environmental law mensuration: 4 credits (60 hours); L, T, P, PW**

1. **Introduction**
   - Scope and definition of environmental law
   - Jurisprudential basis for protecting the environment.
   - Legal norms and standards underpinning environmental management
2. **International Environmental Law**

3. **Overview of the Evolution of Environmental Law in Cameroon**
   - Sources & History of Environmental Law.
   - The Cameroonian Constitution & Environmental legislation
   - Administration & enforcement of Environmental Law in Cameroon
4. **Environmental Management**
   - Identification of environmental management tools in Cameroon
   - Evaluation and assessment of environmental management in Cameroon
5. **Selected Topics: Natural Resource Conservation & Management**

❖ AGF 242: Certification and Sustainable forest Governance

- **Certification and sustainable forests Governance: 5 credits (75 hours); L, T, P, SPW**

1. **Essential elements of forest certification programs**
   - The concept of forest certification
   - Institutional elements of forest certification programs
2. **Existing forest certification programs**
   - The forest stewardship council
   - The sustainable forestry initiative
   - LembagaEkolabel Indonesia
   - The pan-european forest certification council
3. **Common program challenges**
4. **Forest management practices that ensure ecosystem sustainability**
5. **Sustainable, structured, and transparent forest management**

❖ AGF 243: Wood processing and utilization mensuration

- **Wood processing and utilization mensuration: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Appreciate the importance of using appropriate method during logging
- Reasons and methodsof wood preservation

1. Filling and logging techniques
2. Wood conservation and processing
3. Wood seasoning and preservation

❖ AGF 244: Forest protection and log control

- **Forest protection and log control: 4 credits (60 hours); L, T, P, SPW**

Objective

Master Agroforestry protection techniques and control of agroforestry predators

1. Implementation of agroforestry
2. Study of pest and disease management in commercial forestry
3. Protection against fire encroachment and illegal felling

❖ AGF 245: Cartography

- **Cartography: 4 credits (60 hours); L, T, P, SPW**

Objective

- Didactics and aids in Agroforestry
- Preparation of didactics and aids in agroforestry

1. Construction of field reconnaissance and topography maps
2. Preparation of maps from aerial and satellite imagery

❖ AGF246:Professional Internship

- **Professional Internship: 6 credits (90 hours); L, T, P, SPW**

1. Working in a company
2. Holding of the Intern journal
3. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
4. Elaboration of method of research
5. Resources to beexploited
6. Organization of work
7 Drafting of the report

❖ AGF 247: Labour Law

- **Labour Law: 3 credits (45 hours); L, T, SPW**

A- First part

1. The concept of Law;
2. The characters of the Law Rule;
3. Sources of Law (Hierarchical norms);
4. Enforcement (Non-retroactivity of the law and the territoriality of the law);
5. Judicial institutions (Courts of first instance, principle of double jurisdiction, appeal on points of law);
6. Sanctions of violation of the rule of law (Inhibition, execution, reparation, repression);

B- Second part

1. Sources of Labour Law

2. The different employment contracts (classic contracts and precarious contracts)
3. Execution of the employment contract (salary and salary claim, various professional sanctions)
4. Dismissal and resignation;
5. Resolution of labor disputes

Field : ENVIRONMENTAL SCIENCES

Specialty :

NATURE MANAGEMENT AND PROTECTION

Field: ENVIRONMENTAL SCIENCES

Specialty: Nature Management and Protection

1. The objective of the training

Training students in Nature Management and Protection serve to appreciate available resources, the finiteness of resources, and the moral and legal responsibility to protect resources.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knowledge in:

- Biology, geography, geology. biology
- Definition of environmental management
- Impact of man on the environment
- Climate change issues
- Pollution and the waste problem
- Land laws and management

→ **Specific Skills**

- Improve on environmental stability;
- Manage forests, environment, and wildlife;
- Ensures that the consumption of resources and their associated impacts do not exceed the carrying capacity of the environment;
- Conserve living organisms in the environment;
- Able to manage ecosystems;

- Develop skills to resolve conflicts that arise from the exploitation of these resources;
- Integrate management of these resources with overexploitation issues;
- Protect reserves and Game Parks;
- Ensure a sustainable usage and management of these natural resources and environmental protection;
- Conserve living organisms in the environment;
- Conserve life in its natural as well as out of its natural environment;
- Able to manage ecosystems;
- Manage non-timber forest products objective;
- Protection of naturalresources.

3. Career opportunities

- State ministries related to the environment;
- Botanical gardens;
- Tour guides, and conservationist jobs.
- Environmentalist and Nature Protection;
- Personal initiative as cooperative or NGO's promoting sustainable natural resource use.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		Specialty: Nature Management and Protection					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
NMP111	Mathematics	30	20	5	5	60	4
NMP112	Physics	45	20	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
NMP113	Introduction to environmental management	30	20	5	5	60	4
NMP114	Natural resources in Cameroon	30	20	5	5	60	4
NMP115	Characteristics of resource management	45	15	10	5	45	5
NMP116	Sanitation I	35	35		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
NMP117	Bilingual Training	30	10		5	45	3
Total		**185**	**140**	**30**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		Specialty: Nature Management and Protection					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
NMP121	Biochemistry	40	15		5	60	4
NMP122	Statistics & Probability	45	20	5	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
NMP123	Principles of Biodiversity	40	15		5	60	4
NMP124	Ex-situ and In-situ Conservation	45	20	5	5	75	5
NMP125	SustainableWater Development	40	15		5	60	4
NMP126	Sanitation II	45	20	5	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
NMP127	Information Technology in Nature Management and Protection	30	10		5	45	3
Total		**230**	**90**	**70**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		Specialty: Nature Management and Protection					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
NMP231	Microbiology	40	25	5	5	75	5
NMP232	Pedology	35	20	-	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
NMP233	General Ecology	40	20	10	5	75	5
NMP234	Non-Timber Forest products	30	15	10	5	60	4
NMP235	Pollution Prevention	30	15	10	5	60	4
NMP236	Irrigation	35	35		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
NMP237	Civic Education and Ethics/Initiation to the law	30	10		5	45	3
Total		**270**	**140**	**35**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		Specialty: Nature Management and Protection					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
NMP241	Rural extension	45	25	-	5	75	5
NMP242	Chemistry	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
NMP243	Protection Of Natural Resources	30	20	5	5	60	4
NMP244	Natural Resource Conflicts Management And Resolution	30	20	5	5	60	4
NMP245	Sustainable Water Development	30	20	5	5	60	4
NMP246	Internship	-	-	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
NMP247	Computer and Multimedia	30	10		5	45	3
Total		**205**	**110**	**75**	**60**	**450**	**30**

5. Courses content

❖ NMP 111: Mathematics

➢ **Mathematics: 4 credits 60 hours); L, T, P, SPW**

1. Functions of a real variable
2. Circular functions, hyperbolic and their reciprocal
3. Differential of a function
4. Differential equations
5. Taylor's Formula and Limited Developments
6. Simple integrals and applications
7. Multiple integrals and applications to surface and volume calculation

❖ NMP 112: Physics

➢ **Physics: 5 credits (75 hours); L, T, P, SPW**

1. **Viscosity of fluids: introduction to the rheology.**
   - Notions of rheology;
   - Definitions of the coefficients of viscosity;
   - The influence of different parameters on the viscosity;
   - rheological behavior and classification of fluids;
   - methods of measurement of viscosity.
2. **Spectrometry of particles**
   - Field and electricpotential;
   - Magneticfield;
   - Magnetizedenvironments;
   - Radioactive transformations.
3. **Spectrometry of electromagnetic radiation.**
   - General information on the waves;
   - Wave nature of light;
   - Study of the sources of electromagnetic radiation;
   - Geometricaloptics approximation;
   - Dispersive systems to network;
   - light sensors;
   - Spectroscopic methods
4. **Metrology**
   - The International System of Units and the usual units;
   - equation to the dimensions and homogeneity of a relationship;
   - quality of a measurement:
     - Systematic errors, fidelity, accuracy, precision;
     - Resolution and Sensitivity of a measuring device;
     - Uncertainties on the result: statistical treatment of a series of measures; central tendency (Average, median);

❖ NMP 113: Introduction to environmental management

- **Introduction to environmental management: 4 credits (60 hours); L, T, P, SPW**

Objective: The aim of the programme is to develop the understanding of the environmental and land-based sector, its processes and systems drawing on moral, ethical, commercial, political and social viewpoints.

1. Definition of environmental management
2. Impact of people on the environment
3. Climate change issues
4. Pollution and the waste problem
5. Land laws and management

❖ NMP 114: Natural resources in Cameroon

- **Natural resources in Cameroon: 4 credits (60hours);L, T, P, SPW**

Objective: aiming at ensuring that the consumption of resources and their associated impacts do not exceed the carrying capacity of the environment and breaking the linkages between economic growth and resource use.

1. Protected resources
2. Renewable resources
3. Non-renewable resources
4. Other groups of resources
5. Balancing pressure on natural sources

❖ NMP115: Characteristics of resource management

- **Characteristics of resource management: 5 credits (75 hours); L, T, P, SPW**

Objective: ensure a sustainable usage and management of these natural resources and environmental protection.

1. Measures and measurement of uses of resources by humans and animals
2. Impact on the environment,
3. Integrated resource management processes
4. New economic development model
5. Applicability in Cameroon (laws and legislation)

❖ NMP 116: Sanitation I

- **Sanitation I: 5 credits (75 hours); L, T, P, SPW**

1. Health aspects of sanitation
2. Main diseases due to poor sanitation

3. Barriers to progress in sanitation
4. Environmental Health protection measures and methods of control
5. Health education and promotion
6. Epidemiology and disease control
7. Social, natural, health sciences, economic and engineering science

❖ NMP117: Bilingual Training

➢ **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;

- Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ NMP 121: Biochemistry

➢ **Biochemistry: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plant and animal production and technology

1. Protein, Amino Acids, and Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. The Enzymes
6. Introductions to Metabolism
7. Energy Transfer Process
8. Metabolisms of Carbohydrates

❖ NMP122: Statistics & Probability

➢ **Statistics & Probability: 5 credits (75 hours); L, T, P, SPW**

Objective:

Students will learn relevant statistical tools and techniques to collect, analyse and present data

Students gain knowledge on how to design, exploratory and secondary research as well as data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Whystudystatistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Othernumericalmeasures
5. **Simple linearregression and correlation**
   - Introduction
   - Somedefinition
   - Scatterdiagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ NMP123: Principles of Biodiversity

- **Principles of Biodiversity**: **4 credits (60 hours); L, T, P, SPW**

Objective: Conservation of living organisms in the environment

1. Levels of diversity
2. Importance of biodiversity
3. Losses in biodiversity
4. Convention on biological diversity and other conventions
5. Convention control measures

❖ NMP 124: Ex-situ and In-situ Conservation

- **Ex-situ and In-situ Conservation: 5 credits (75 hours); L, T, P, SPW**

Objective: Conservationof life in its natural as well as out of its natural environment

1. Different conservation methods
2. Zoos/botanical gardens
3. Museums/ UNESCO sites
4. Gene banks/Watch lists
5. Protected reserves and game parks

❖ NMP125: Sustainable water development

- **Sustainable water development: 4 credits (60 hours);L, T, P, SPW**

1. Understanding Environment, Development and Sustainability: Concepts of global change under the context of development and globalization and impact on local environment; impacts on bio-physical and socio-economic conditions of various systems and sectors in society;
2. Social Impact on water resources: Development issues in terms of social phenomena, dynamic development and process of social cultural, economic and environmental changes; development patterns effecting natural water
3. Urban Development and Planning: Factors influencing water utilities and the role and expansion directions of urban settlements at different levels of community.
4. Utilization of water as a renewable Resources and managing water resources in a Changing Climate
5. Adaptation Policy Framework: adaptation policy to climate change and measures in a sustainable development context; adaptation and strategies at different levels and sectors in society to better manage future risk
6. Vulnerability Study of urban water resources for Sustainable Development Planning
7. Strategic environmental assessment: A systematic process for evaluating and anticipating the consequences of decisions taken prior to the project stage to ensure that environmental considerations and alternatives are addressed

❖ NMP 126: Sanitation II

- **Sanitation II: 5 credits (75 hours); L, T, P, SPW**

1. Social determinants of health
2. Ethical issues in public health

3. Water Supply, Sanitation, and Hygiene Promotion
4. Food sanitation

❖ NMP 127: Information technology in nature management and protection

- **Information technology in nature management and protection: 3 credits (45 hours); L, T, SPW**

Objective: Computerization in nature management and protection processes

1. Software/hardware principles
2. Application in breeding
3. Application in conservation/protection
4. Management use

❖ NMP 231: Microbiology

- **Microbiology: 5 credits (75 hours); L, T, P, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms of plants and domestic animals.

1. Definition and importance of microbiology
2. General Microbiology Techniques on microbial Identification on microbial Identification
3. Classification of microorganisms
4. Methods of classification
5. Bacteria
6. Mycoplasmas
7. Rickettsiae
8. Fungi
9. Viruses

❖ NMP232: Pedology

- **Pedology: 4 credits (60 hours); L, T, P, SPW**

❖ NMP 233: General Ecology

- **General Ecology: 5 credits (75 hours); L, T, P, SPW**

Objective: Enable students to manage ecosystems

1. Provision of ecosystem services
2. Monitoring changes in an ecosystem
3. Ecology and energy flow in an ecosystem
4. Food webs and food chains

❖ NMP 234: Non-Timber Forest products

- **Non-Timber Forest products: 4credits (60 hours); L, T, P, SPW**

Objective: Avoid depletion of these non-timber forest resources.

1. Introduction to non-timber forest products
2. Integrated management of these resources/ overexploitation issues
3. Policies toward the controled harvesting of these forest products

❖ NMP 235: Pollution Prevention

- **Pollution Prevention: 4 credits (60 hours); L, T, P, SPW**

1. Introduction to Environmental Aspects Related to Pollution Prevention
2. Benefits of Pollution Prevention
3. Waste Management Hierarchy
4. Environmental Issues Concerning Pollution Prevention
5. Production of a Chemical
6. Sources and Impacts of Pollution in
7. Chemical Production
8. Process Internal Measures ;Process External Measures
9. Life Cycle Analysis

❖ NMP 236: Irrigation

- **Irrigation: 5 credits (75 hours); L, T, P, SPW**

1. Introduction to irrigation
2. Soil water characteristics
3. Water source for irrigation
4. Evapotranspiration
5. Irrigation system components
6. Irrigation calculations; Hydraulic calculations
7. Evaluating irrigation efficiency for a specific irrigation system
8. Irrigation uniformity
9. Irrigation scheduling tools

❖ NMP237:Civic education and ethics and Law

- **Civic education and ethics: 1 credit (15 hours); L, T, SPW**

1. Definition of:
   - Ethics
   - Civics
   - Deontology

- Human rights

2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. 8. Profession / Vocation
9. Good governance in public services
10. Human qualities

- **Environmental Law**

- **Labour Law**

❖ NMP 241: Rural extension

- **Rural extension: 5 credits (75 hours); L, T, P, SPW**

1. Basic Principles of rural extension
2. Guiding principles of rural extension
3. The framework of development
4. Understanding extension
5. Social and cultural factors in extension
6. Extension and communication
7. Extension methods
8. The extension agent
9. The planning and evaluation of extension programmes
10. Extension and special target groups

❖ NMP 242: Chemistry

- **Chemistry: 4 credits (60 hours); L, T, P, SPW**

1. **Mineral chemistry**
   - Fundamental Concepts: Reminder of the notions of atom, molecule and mole
   - Electro negativity of the elements, isometry, nomenclature;
   - Study Summary of elements of the block S; Study Summary of elements of the block P;
   - Summary Study of the transition elements.
2. **Organic chemistry**
   - Fundamental concepts;
   - Metal networks;
   - Ionic networks;

- Molecular networks;
- main functions of organic chemistry;
- Alkanes, cyclo-alkanes, alkenes, alkynes, aromatic;
- Halogen drifts;
- Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.

❖ NMP 243: Protection of Natural resources

- **Protection of Natural resources**: **4 credits (60 hours); L, T, P, SPW**

Objective: Sustainability of Environment

1. Documentation of endangered species of plants and animals
2. Protection strategies,
3. Game reserves and national parks, wetlands, tropical forests, water shades, water basins
4. Integrated controls,
5. Costs/legislation

❖ NMP 244: Natural Resource Conflict Management and Resolution

- **Natural Resource Conflict Management and Resolution: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop skills to resolve conflicts that arise from the exploitation of these resources.

1. Analyze current and past conflicts (local, national, international)
2. Costs of conflicts
3. Preventive measures and coping strategies
4. Rehabilitation processes (individual, community, state)
5. Monitoring and evaluation of programmes

❖ NMP 245: Sustainable water development

- **Sustainable water development: 4 credits (60 hours); L, T, P, SPW**
    1. Introduction to integrated water resources
    2. From water-related issues toeconomic and financial instruments
    3. Application of water economic instruments
    4. Water and sanitation

❖ NMP 246: Internship

- **Internship: 6 credits (90 hours); P, SPW**
    1. Arrival and Business Integration
    2. Working in a company

3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ NMP 247: Computer and multimedia

- **Computer and multimedia**: **3 credits (45 hours); L, T, PW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

1. Introduction: Computer components, operating system, software & applications
2. Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

1. Demonstration of computer components and Windows installation.
2. Exercise on the use of word processing, spreadsheet and engineering graphics
3. Programming of engineering problems with C++.

Field : ENVIRONMENTAL SCIENCES

Specialty :

RISK MANAGEMENT

Field: ENVIRONMENTAL SCIENCES

Specialty: Risk Management

1. The objective of the training

Training students inrisk management serves to collect data, establish early warning to adverse weather condition, and Preempt unfavorable conditions andhandle adverse situations when they do arrive. Types of risks (social, agricultural, business conflicts, wars), Dimensions of risk, Risk management planning.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

→ **Specific Skills**

- Analyze environmental and human causes that are likely to lead to harm/losses;
- Examine adverse conditions locally, nationally and internationally;
- Develop strategies to handle disasters;
- Identify climate change trait impact on environment with emphasis on agriculture;
- Acquire skills to prevent and manage risks in small economic enterprises;
- Develop expertise to handledifferent risks associated with agricultural production;
- Enhance the skills to respect, protect and promote peace and human rights;
- Develop and codify in students strategies to manage social risks.

3. Career opportunities

- Insurance companies
- Services that need to be ensured
- Responsible in risk and regulatory change in banking

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		**Specialty: Risk management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RIM111	Mathematics	30	20	5	5	60	4
RIM112	Chemistry	45	25	-	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
RIM113	Fundamentals Of Risk Management	30	20	5	5	60	4
RIM114	Risk Prevention Processes	30	20	5	5	60	4
RIM115	Disasters	45	25	-	5	75	5
RIM116	Managing Risks In Agriculture	45	20	5	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RIM117	Bilingual Training	30	10	-	5	45	3
Total		**155**	**140**	**20**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		**Specialty: Risk management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RIM121	Physics	45	25		5	75	5
RIM122	Biochemistry	30	25		5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
RIM123	Disaster Management Processes	30	20	5	5	60	4
RIM124	Climate Change Risk and Mitigation	30	10		5	45	4
RIM125	Risk Assessment and Management	45	25		5	75	5
RIM126	Learning From Disasters	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RIM127	Information Technology In Risk Management	30	10		5	45	3
Total		**210**	**135**	**65**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Risk management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RIM231	Microbiology	45	25		5	75	5
RIM232	Insurance principles in Cameroon	30	25		5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
RIM233	Risk Management In Business	30	25		5	60	4
RIM234	Managing Risks in AgricultureII	30	25		5	60	4
RIM235	Environnemental Impact Assessment	45	25		5	75	5
RIM236	Human Impact on the Environment	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RIM237	Civic Education and Ethics	30	10		5	45	3
Total		**225**	**160**		**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Risk management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RIM241	Statistics & Probability	40	20	10	5	75	5
RIM242	Value and Risk Management	30	20	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
RIM243	Peace And Humanitarian Action	45	25		5	75	4
RIM244	Social Risk Management	35	20		5	60	4
RIM245	Early Warning Systems	30	10		5	45	4
RIM246	Professional Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RIM247	Legislation and Regulation	30	10		5	45	3
Total		**210**	**105**	**75**	**60**	**450**	**30**

5. Courses content

❖ RIM 111 : Mathematics

- **Mathematics: 4 credits (60 hours); L, T, P, SPW**

Objectives

Atthe end of this course, students will be able to apply mathematics knowledge to agricultural production and business decisions.

1. **Importance of agricultural mathematics to students**
2. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
3. **Use of measures on the farm**
   - Linear measures
   - Square measures (area)
   - Cubic measures (volume)
   - Square roots
4. **Weights and their use**
5. **Trigonometriccalculations**
6. **Measurement conversions**

❖ RIM 112 : Chemistry

- **Chemistry: 5 credits (75 hours); L, T, P, SPW**

1. **Mineral chemistry**
   - Fundamental Concepts: Reminder of the notions of atom, molecule and mole
   - Electro negativity of the elements, types of connections, isometry, nomenclature;
   - Summary study of elements of the block S;
   - Summary study of elements of the block P;
   - Summary Study of the transition elements.
2. **Organic chemistry**
   - Fundamental concepts;
   - Metal networks;

- Ionic networks;
- Molecular networks;
- main functions of organic chemistry;
- Alkanes, cyclo-alkanes, alkenes, alkynes;
- Halogen drifts;
- Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.

❖ RIM 113: Fundamentals of Risk management

- **Fundamentals of Risk management: 4 credits (60 hours); L, T, P, SPW**

Objective: Analyze environmental and human causes that are likely to lead to harm/losses

1. Definition of terms (risks, shocks, disaster, mitigation, coping strategies, geographic information systems (GIS)
2. Types of risks (social, agricultural, business conflicts, wars)
3. Dimensions of risk
4. Risk management planning

❖ RIM 114: Risk prevention Processes

- **Risk prevention Processes: 4 credits (60 hours); L, T, P, SPW**

Objective: Acquire skills in pre-empting minimizing losses and harm

1. Past and current trends of risks with emphasis on local and national environments.
2. Data collection and interpretation
3. Planning systems (early warning, information dissemination, social changes, impact assessment)
4. Risk reduction systems (proactive, reactive)
5. Formal and informal systems of prevention

❖ RIM 115: Disasters

- **Disasters: 5 credits (75 hours); L, T, P, SPW**

Objective: Examine adverse conditions locally, nationally and internationally

1. Definition and dimensions of disasters (risks, hazards, shocks
2. Analysis of disasters in Cameroon (floods, droughts, lake Nyos, landslides, pests and diseases, wars, refugee crises)
3. Causes of disasters (natural, humans, climate change)

❖ RIM 116: Managing risks in agriculture

- **Managing risks in Agriculture: 5 credits (75 hours); L, T, P, SPW**

Objective: Develop expertise to handle different risks associated with agricultural production

1. Definition and explanation of concept, description of the agricultural cycle and the risks involved at each stage,
2. Types of agricultural risk management strategies, advantages and disadvantages of each -strategy, effects of improper agricultural risk management options,
3. Benefits of adopting proper agricultural risk management strategies
4. Introduction to agricultural insurance.

❖ RIM 117: Information technology in Risk management

- **Information technology in Risk management: 3 credits (45 hours); L, T, P, SPW**

Objective: Computerization in risk management processes

1. Software/hardware principles
2. Application in breeding
3. Application in proactive/reactive processes
4. Management use

❖ RIM 121: Physics

- **Physics: 5 credits (75 hours); L, T, P, SPW**

1. **General physics**
   - Introduction to classical physics;
   - Radiation interaction-matter-radiation;
   - notions of Mechanics of the point, the strong and fluids;
   - electricity and electromagnetism.
2. **Biophysics**
   - The concepts of thermodynamics, chemical and physical;
   - Acid-base properties of solutions;
   - Transmembrane Transport;
   - The interactions of radiation with matter;
   - Radiation: production, properties;
   - Biological effects of ionizing radiation;
   - Sound waves;
   - Elements of optics.

❖ RIM 122: Biochemistry

- **Biochemistry: 4 credits (60 hours);L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plants and animal production and technology

1. Protein, Amino Acids, and Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. Enzymes
6. Introductions to Metabolism
7. Energy Transfer Process
8. Metabolisms of Carbohydrates
9. PRACTICAL BIOCHEMISTRY
10. Buffer Systems
11. Colorimetry /visible Spectrophotometric
12. Protein Estimation
13. Chemistry of Lipids
14. Quality Control Analysis

❖ RIM 123: Disaster Management Processes

- **Disaster Management Processes: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop strategies to handle disasters

1. Disaster management strategies
2. Prevention (proactive/reactive), reduction,
3. Coping, adaptation, resilience
4. Disaster management instruments (informal, formal)

❖ RIM 124: Climate change risk and mitigation

- **Climate change risk and mitigation: 4 credits (60 hours); L, T, P, SPW**

Objective: Identify climate change trait impact on environment with emphasis on agriculture

1. Normal local and national climate characteristics
2. Characteristics of climate change (local, national, international)
3. Impacts of climate change (current, potential)
4. Preventive measures (local, national, international)
5. Costs, applicability/ legal frame work

❖ RIM 125: Risk assessment and management

- **Risk assessment and management: 5 credits (75 hours); L, T, P, SPW**

1. Environmental Risk Formulation Mechanism
2. Environmental Risk Zoning
3. Theoretical Framework of Whole-Process Management Mechanism of Environmental Risk
4. Environmental Risk Source Management
5. Regional Environmental Safety Planning
6. Environmental Risk Emergency Management
7. Assessment and Environmental Restoration after the Occurrence of Environmental Pollution Incidents

❖ RIM 126: Learning from disasters

- **Learning from disasters: 5 credits (75 hours); L, T, P, SPW**

1. The natural disaster type and context
2. The context of poverty reduction and disaster management policies
3. Needs assessment
4. Coordination and implementation of recovery; Coordination and implementation at the district level
5. Community participation and communication
6. Donor conference and response; Balance of payments and debt relief
7. Impact and Livelihoods

❖ RIM 117: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.

5. **Write clear, detailed texts**
    - Essay writing;
    - Application for employment;
    - C.V;
    - Letter of motivation;
    - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
    - Vocabulaire du matériel de **technologie agro-alimentaire**
    - Vocabulaire des **produits agro-alimentaires**
    - Vocabulaire des **activités agro-alimentaires**
    - Vocabulaire des **actants**
    - Vocabulaire des **affaires**
2. **Grammaire**
    - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
    - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
    - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
    - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
    - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
    - Des fonctions grammaticales.
3. **Expression et communication**
    - Compréhension et interaction au cours d'une discussion technique ;
    - Communication orale courante ;
    - Communication orale interactive ;
    - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
    - Lecture rapide et compréhension de texte ;
    - Synthèse de texte
    - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
    - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
    - Expressions figées

❖ RIM 231: Microbiology

- **Microbiology: 5 credits (75 hours); L, T, P, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms of plants and domestic animals.

1. Definition and importance of microbiology
2. General Microbiology Techniques on microbial Identification on microbial Identification
3. Classification of microorganisms
4. Methods of classification
5. Bacteria
6. Mycoplasmas
7. Rickettsiae
8. Fungi
9. Viruses

❖ RIM 232: Insurance principles in Cameroon

- **Insurance principles in Cameroon: 4 credits (60 hours); L, T, P, SPW**

Objective: Analyse formal risk management systems

1. Current systems (state, private)
2. Types of insurance systems,
3. Legal frame work. Financial issues(subscription/payments)
4. Litigation issues
5. Social/human costs

❖ RIM 233: Risk management in business

- **Risk management in business: 4 credits (60 hours); L, T, P, SPW**

Objective: Acquire skills to prevent and manage risks in small economic enterprises

1. Definitions and types of business risks (investment risks, banking risks, strategic risks, compliance risks, financial risks, operational risks, market/environmental risks ,etc),
2. Benefits of risk management,
3. Role of human resource management in business risk management
4. Turning risks into opportunities, planning for risk management in businesses, examples.

❖ RIM 234: Managing risks in Agriculture

- **Managing risks in Agriculture: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop expertise to handledifferent risks associated with agricultural production

1. Definition and explanation of concept, description of the agricultural cycle and the risks involved at each stage,
2. Types of agricultural risk management strategies, advantages and disadvantages of each -strategy, effects of improper agricultural risk management options,
3. Benefits of adopting proper agricultural risk management strategies
4. Introduction to agricultural insurance.

❖ RIM 235: Environmental Impact Assessment

➢ **Environnemental Impact Assessment: 5 credits (75 hours); L, T, P, SPW**

1. **Introduction to the Environmental Impact Assessment Process**
   - Introduction to the EIA Process
   - The Legislative Background
   - The Projects that are Subject to EIA
   - Criteria for Deciding whether EIA is Required
   - Provisions Introduced for Projects that Required a New Consenting Procedure
   - The Contents of an Environmental Statement
   - Importance of Compliance with the Directive
2. **Prior to the Submission of the Environmental Statement**
   - Deciding whether EIA is Required: the 'Screening' Process
   - Requiring the Submission of an Environmental Statement
   - Preliminary Contact and Liaison
   - Scoping the Environmental Statement
   - Provision of Information
   - Describing Baseline Environmental Information
   - Predicting Environmental Impacts
   - Assessing the Significance of Impacts
   - Mitigating Measures and Enhancement
   - Presenting Environmental Information in the Environmental Statement
3. **Consideration of the Environmental Satement**
   - Submission of Environmental Statement and Project Application Consent: the Roles of the Competent Authority, the Developer and Consultees
   - Consultation and Publicity
   - Liaison with the Competent Authority and the Developer
   - Wider Consultation and Dissemination
   - Transboundary Environmental Effects
   - Requiring More Information or Analysis
   - Negotiating Modifications of the Project
   - Is a Supplementary Environmental Statement Required?
   - Reviewing the Environmental Statement
   - Formulating a Consultation Response
   - Outline Planning Applications

4. **The Decision Making stage**
    - Adopting the Precautionary Principle
    - Relationship of EIA with the Development Plan and Other Consent Procedures
    - Guaranteeing Commitments and Compliance
    - The Decision of the Competent Authority

❖ RIM 236: Human impact on the environment

➢ **Human impact on the environment: 5 credits (75 hours); L, T, P, SPW**

1. Summarizing the human impacts on the environment
2. Environmental effects
3. Social and economic effects
4. Information gaps and capacity building gaps
5. Environmental Health Index
6. Water quality indexes
7. Ecological quality objectives

❖ RIM 237: Civic education and ethics

➢ **Civic education and ethics: 3 credits (45 hours); L, T, SPW**

1. Definition of:
    - Ethics
    - Civics
    - Deontology
    - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services
10. Human qualities

❖ RIM 241: Statistics & Probability

➢ **Statistics & Probability: 5 credits (75 hours); L, T, P, SPW**

Objective:
Students will learn relevant statistical tools and techniques to collect, analyse and present data

Students gain knowledge on how to design exploratory and secondary research as well as data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Whystudystatistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Othernumericalmeasures
5. **Simple linearregression and correlation**
   - Introduction
   - Somedefinitions
   - Scatterdiagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ RIM 242: Value and Risk management

- **Value and Risk management: 4 credits (60 hours); L, T, P, SPW**

❖ RIM 243: Peace and Humanitarian action

- **Peace and Humanitarian action: 4 credits (60 hours); L, T, P, SPW**

Objective: Enhance the skills to respect, protect and promote peace and human rights.

1. Social peace disturbances issues (risks, shocks, disasters, conflicts)
2. Integrated preventive measures (peace building, individual, community, national, international actions)

3. Humanitarian actions (informal/formal: individuals, churches, NGO, Red Cross/Crescent)
4. Refugees management
5. Costs/legal frame work

❖ RIM 244: Social risk management

- **Social risk management: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop and codify in students, strategies to manage social risks

1. Definition of terminology
2. Types of social risks faced by both individuals and organizations, review the concept of the social Security system and the role played by individuals
3. Characteristics of group insurance and the types of group insurance most frequently used to achieve security, the surety and fidelity bonding principles, social insurance and safety nets and their impacts on poverty
4. Livelihood security and sustainability

❖ RIM 245: Early Warning Systems

- **Early Warning Systems: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop abilities and mechanisms to prevent and manage risks and disasters.

1. Data collection systems (Geographic Information Systems, remote sensing)
2. Local environmental data, indigenous knowledge
3. Environmental impact analysis (EIA),
4. Public Participatory GIS and disaster Risk management (Pre and Post Disaster,
5. Public/political will
6. Costs/legal frame work

❖ RIM 246: Professional Internship

- **professional Internship: 6 credits (90 hours); P, SPW**

Objective: Find practical solutions to constraints on the job space

1. Spend a minimum of 30 days on the job in any private or public establishment
2. Diagnose and identify practical bottleneck
3. Apply possible solution (if possible) or suggest one
4. Write report according to prescribed HND format and defend in public

❖ RIM247: Legislation and regulation

- **Legislation and regulation: 3 credits (45 hours); L, T, SPW**

Field : ENVIRONMENTAL SCIENCES

Specialty :

POLLUTION PREVENTION AND REMEDIATION

Field:	ENVIRONMENTAL SCIENCES

Specialty:	Pollution, Prevention and Remediation

1. The objective of the training

Training students in pollution prevention and remediationserves toexamine causes and develop strategies to combat this phenomenon, analyze the various components adverse effects.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knownledge in :

- Definition of environmental pollution
- Sources of pollution
- Awareness of pollution
- Water pollution
- Air pollution
- Soil pollution

→ **Specific Skills**

- Develop skills to protect the environment;
- Clean contaminated environments;
- Assess the impact of soil pollution;
- Analyze the quality of air for humans and living systems;
- Apply possible solution or suggestions;
- Computerize pollution prevention and remediation process ;
- Examine causes and develop strategies to combat this phenomenon

- Analyze the various components adverse effects;
- Develop skills to protect the environment;
- Determine the nature of water;
- Analyze the quality of air for humans and living systems;
- Find practical solutions to constraints on the job space;
- Assess the impact of soil pollution.

3. Career opportunities

- Consultants in Environment
- Eco-educators
- Conservators of natural spaces

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		**Specialty: Pollution Prevention and Remediation**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
PPR111	Physics	30	25		5	60	4
PPR112	Chemistry	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
PPR113	Introduction to Environmental pollution	30	20	5	5	60	4
PPR114	Types of Environmental pollution	30	20	5	5	60	4
PPR115	Monitoring of pollutedenvironments	45	20	5	5	75	5
PPR116	Drainage and Irrigation	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
PPR117	Bilingual Training	30	10		5	45	3
Total		**250**	**140**	**25**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		**Specialty: Pollution Prevention and Remediation**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
PPR121	Mathematic1	30	20	5	5	60	4
PPR122	Microbiology	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
PPR123	Pollution Prevention	30	25		5	60	4
PPR 124	Pollution environmentremediation	30	25		5	60	4
PPR125	Industrial activities and the Environment	45	25		5	75	5
PPR126	Treatment and disposal of solid waste	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
PPR127	Information technology in pollution prevention and remediation	30	10		5	45	3
Total		**195**	**125**	**70**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Pollution Prevention and Remediation**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
PPR231	Biochemistry	45	20	5	5	75	5
PPR232	Vectors for dissemination (air, water, soil)	35	15	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
PPR233	Environmental benefits of recycling	45	20	5	5	75	5
PPR234	Water Pollution	45	20	5	5	75	5
PPR235	Sustainable Agriculture and good practice	40	15		5	60	4
PPR236	Pest Control	40	15		5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
PPR237	Civic education and ethics/ Environmental Law and Labour Law	30	10		5	45	3
Total		**280**	**115**	**20**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Pollution Prevention and Remediation**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
PPR241	Mathematic II	45	25		5	75	5
PPR242	Statistics and probability	40	10	5	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
PPR243	Air Pollution	40	10	5	5	60	4
PPR244	Soil Pollution	40	10	5	5	60	4
PPR245	Environmental Toxicology	40	15		5	60	4
PPR246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
PPR247	Computer and multimedia	25	10	5	5	45	3
Total		**230**	**80**	**80**	**60**	**450**	**30**

5. Courses content

❖ PPR 111 :Physics

- **Physics : 4 credits (60 hours); L, T, P, SPW**

1. **General physics**
   - Introduction to the classical physics;
   - Radiation interaction-matter-radiation;
   - notions of Mechanics of the point, the strong and fluids;
   - Electricity and electromagnetism.
2. **Biophysics**
   - The concepts of thermodynamics, chemical and physical;
   - Acid-base properties of solutions;
   - Transmembrane Transport;
   - The interactions of radiation with matter;
   - The radiation: production, properties;
   - Biological effects of ionizing radiation;
   - Sound waves;
   - Elements of optics.

❖ PPR 112 : Chemistry

- **Chemistry: 5 credits (75 hours); L, T, P, SPW**

1. **Mineral chemistry**
   - Fundamental Concepts: Reminder of the notions of atom, molecule and mole, etc.…
   - Electro negativity of the elements, types of connections, isometry, nomenclature;
   - Summarystudyof elements of the block S; Summary study of elements of the block P;
   - Summary Study of the transition elements.
2. **Organicchemistry**
   - Fundamental concepts;
   - Metal networks;
   - Ionic networks;
   - Molecular networks;

❖ PPR 113 : Introduction to Environmental pollution

- **Introduction to Environmental pollution: 4 credits (60 hours); L, T, P, SPW**

Objective: Examine the causesof pollution and develop strategies to combat this phenomenon.

1. Definition of environmental pollution
2. Sources of pollution
3. Awareness of pollution
4. Short and long term cost

❖ PPR 114: Types of Environmental pollution

- **Types of Environmental pollution: 4 credits (60 hours); L, T, P, SPW**

Objective: Analyze the various components of environmental pollution adverse effects

1. Man made versus natural (industrial, disaster, volcanoes etc.)
2. Water pollution
3. Air pollution
4. Soil pollution

❖ PPR 115: Monitoring of polluted environments

- **Monitoring of polluted environments: 5 credits (75 hours); L, T, P, SPW**

Objective: Cleaning of contaminated environments:

1. Manual systems
2. Automated systems (chemical, biological, genetically engineered)
3. Integrated systems (local, national, international)
4. Standards/ control
5. costs/legal framework

❖ PPR 116: Drainage and Irrigation

- **Drainage and Irrigation: 5 credits (75 hours); L, T, P, SPW**

Drainage System: Investigation procedure, Moisture holding capacity in the root zone, annual irrigation schedule, deep percolation from irrigation, sources causing high water table conditions, determination of barrier zone and drain locations.

1. Introduction to irrigation
2. Soil water characteristics
3. Water source for irrigation
4. Evapotranspiration

5. Irrigation system components
6. Irrigation calculations; Hydraulic calculations
7. Evaluating irrigation efficiency for a specific irrigation system
8. Irrigation uniformity
9. Irrigation scheduling tools

❖ PPR 117: Bilingual Training

➢ **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;

- Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ PPR 121: Mathematic I

➢ **Mathematic I : 4 credits (60 hours); L, T, P, SPW**

1. Suites and actualseries
2. NumericalFunctions
3. Full calculation (primitives, surface integral and volume)
4. Differential Equations of the first and second-order
5. Use of computer tools for the resolution of equations and for the full calculation by the numerical methods
6. Vectorspace
7. Linear application
8. Matrix calculations (Determining, matrices of order, own values, eigenvectors, the diagonalization of the matrices)
9. Polynomials, divisions, rational fractions
10. Flat curves

❖ PPR 122 : Microbiology

➢ **Microbiology: 5 credits (75 hours); L, T, P, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms of plants and domestic animals.

1. Definition and importance of microbiology
2. General Microbiology Techniques on microbial Identification on microbial Identification

3. Classification of microorganisms
4. Methods of classification
5. Bacteria
6. Mycoplasmas
7. Rickettsiae
8. Fungi
9. Viruses

❖ PPR 123 : Pollution Prevention

- **Pollution Prevention : 4 credits (60 hours); L, T, P, SPW**

Objective: Develop skills to protect the environment

1. Proactive methods (individual, community, national, international)
2. Pollution prevention educative systems
3. Pollution preventive binding conventions
4. legality/policies

❖ PPR 124 : Pollution environment remediation

- **Pollution environment remediation: 4 credits (60 hours); L, T, P, SPW**

Objective: Cleaning of contaminated environments

1. Definition of remediation
2. Types of remediation mechanisms
3. Biological and chemical treatments
4. Remediation policies
5. Legality/costs

❖ PPR 125: Industrial activities and the Environment

- **Industrial activities and the Environment: 5 credits (75 hours); L, T, P, SPW**

Objective: Review industrialization and environmental effects

1. Industrial activities on the environment
2. Job creation/industrialization versus environmental pollution
3. Environmental pollution as a result of industrial activities
4. Industrialization and sustainable development
5. National/international policies

❖ PPR 126: Treatment and disposal of solid waste

- **Treatment and disposal of solid waste: 5 credits (75 hours); L, T, P, SPW**

1. Manual separation
2. Mechanical separation

3. Design of processing facility
4. Yard waste and food waste processing
5. Processing and recycling construction and demolition debris,
6. Design of Solid Waste Treatment Plants
7. Classification of waste
8. Landfilling methods and operations

❖ PPR 127: Information technology in pollution prevention and remediation

- **Information technology in pollution prevention and remediation:3 credits (45 hours); L, T, SPW**

Objective: Computerization of pollution prevention and remediation processes

1. Software/hardware principles
2. Application in breeding
3. Application in proactive/reactive processes
4. Management use

❖ PPR 231:Biochemistry

- **Biochemistry: 5 credits (75 hours); L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plants and animal production and technology

1. Protein, Amino Acids, and Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. Enzymes
6. Introductions to Metabolism
7. Energy Transfer Process
8. Metabolisms of Carbohydrates
9. PRACTICAL BIOCHEMISTRY
10. Buffer Systems
11. Colorimetry /visible Spectrophotometric
12. Protein Estimation
13. Chemistry of Lipids
14. Quality Control Analysis

❖ PPR 232: Vectors for Dissemination (Air, Water, Soil)

- **Vectors for Dissemination (Air, Water, Soil): 4 credits (60 hours); L, T, P, SPW**

❖ PPR 233: Environmental benefits of recycling

- **Environmental benefits of recycling:4 credits (60 hours);L, T, P, SPW**

1. Introduction to recycling processes
2. Life cycle assessment
3. Goal and scope definition
4. Inventory analysis
5. Impact assessment
6. Quantifying the benefits of recycling
7. Waste collection assumptions
8. Landfill assumptions
9. Material recover facility assumptions
10. Assumptions on energy production
11. Recycling materials by category
12. Comparison of materials within categories: Metals, Concrete, brick and asphalt , Paper and cardboard, Organics , Glass , Plastics.

❖ PPR 234: Water Pollution

- **Water Pollution: 5 credits (75 hours); L, T, P, SPW**

Objective. Determine the nature of water

1. sources and drivers of nutrient pollution
2. causes of eutrophication
3. consequences and
4. control in aquatic ecosystem

❖ PPR 235 : Sustainable Agriculture and good practice

- **Sustainable Agriculture and good practice: 4 credits (60 hours); L, T, P, SPW**

1. Approach to Influencing Agricultural Policy and Practice
2. The Role of Trans-disciplinary Processes in Sustainability Assessment of Agricultural Systems
3. Farm-level Indicators of Sustainable Agriculture
4. Farm Sustainability Assessment
5. Tools for Improving Sustainability in Agriculture
6. Agri-environmental Indicators to Support the Development of Agricultural Policy
7. Agri-environmentalIndicators and Policies

❖ PPR 236 : Pest Control

- **Pest Control: 4 credits (60 hours); L, T, P, SPW**

1. Pesticide Fundamentals Introduction
2. Introduction to Agricultural Pesticide Application
3. Common Pesticide Applications and Methods

4. Decontamination and Emergency Requirements
5. Personal Protection Equipment, Safety, Health
6. Insect Identification
7. Bee Control
8. Common Crop Insects and Pesticide Controls

❖ PPR 237: Civic education and ethics, Environmental law, Labour Law

- **Civic education and ethics, Environmental law, Labour Law: 3 credits (45 hours); L, T, SPW**

- **Civic education and ethics:**

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services
10. Human qualities

- **Environmental Law**

- **Labour Law**

❖ PPR 241:Mathematic II

- **Mathematic II : 5 credits (75 hours); L, T, P, SPW**

1. matrix theory, differential calculus
2. First order differential equations
3. Linear differential equations
4. Laplace transformation, integral calculus, vector calculus
5. Finite differences: Difference tables, forward, backward and central differences; Linear systems: Matrix methods, Gaussian elimination.

❖ PPR 242: Statistics and probability

- **Statistics and probability: 4 credits (60 hours); L, T, P, SPW**

1. Descriptive statistics to a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimating
7. Hypothesis Test of KHI-two
8. Discrete probability spaces
9. Examples of discrete probability spaces
10. Countable and uncountable
11. On infinite sums
12. Basic rules of probability
13. Inclusion-exclusion formula

❖ PPR 243: Air Pollution

- **Air Pollution: 4 credits (60 hours); L, T, P, SPW**

Objective: Analyze the quality of air for humans and living systems

1. sources and drivers of nutrient pollution
2. causes of air pollution
3. consequences and
4. control in air ecosystem

❖ PPR 244: Soil Pollution

- **Soil Pollution: 4 credits (60 hours); L, T, P, SPW**

Objective: Assess the impact of soil pollution

1. sources and drivers of soil pollution
2. causes of soil pollution
3. consequences and
4. control in soil ecosystem

❖ PPR 245: Environmental Toxicology

- **Environmental Toxicology: 4 credits (60 hours); L, T, P, SPW**

1. Discuse safe levels of exposure,
2. Review standards for toxic substances.
3. Increase awareness of toxins
4. Acute toxicity

❖ PPR 246: Internship

- **Internship: 6 credits (90 hours); P, SPW**

❖ PPR 247: Computer and multimedia

- **Computer and multimedia : 3 credits (45 hours); L, T, P, SPW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

1. Introduction: Computer components, operating system, software & applications
2. Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

1. Demonstration of computer components and Windows installation.
2. Exercise on the use of word processing, spreadsheet and engineering graphics
3. Programming of engineering problems with C++.

Field : ENVIRONMENTAL SCIENCES

Specialty :

METEOROLOGY

Field: ENVIRONMENTAL SCIENCES

Specialty: Meteorology

1. The objective of the training

Training student's inmeteorologyservicesto enhance agricultural practices within appropriate agro-ecological zones; ensure early detection of climatologically changes.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knowledge in :

- Theoretical physics and chemistry applied to atmosphere
- Thermodynamics
- Hydrodynamics
- Radiation transfer

→ **Specific Skills**

- Appreciate the importance of quantification and meteorological data is collected and interpreted;
- Apply meteorological concepts to weather analysis and forecast;
- Analyze impact of climate conditions in an environment;
- Explain the nature and scope of climatology;
- Explain the elements and factors of weather and climate;
- Explain the dynamics of the atmosphere;
- Appreciate the dynamics of pressure and wind systems;
- Appreciate the seasonal variations in the different factors of the climate;

- Identify the equipment used to measure the various elements of climate and state how to maintain them;
- Understanding of atmospheric processes;
- Appreciate the importance of quantification;
- Able to apply meteorological concepts to weather analysis and forecast;
- Apply meteorological principles to specific heights.

3. Career opportunities

- Responsible for departmental, regional or national analyses and forecasts;
- Computer center technician;
- Higher technician instrumentation and installations.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		Specialty: Meteorology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MET111	Statistics and Mathematics	40	30	0	5	75	5
MET112	Initiation to mapping and GIS	20	20	15	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MET113	Climate change and natural hazards	30	20	20	5	75	5
MET114	General and applied Hydrology	30	20	20	5	75	5
MET115	General pedology	25	15	15	5	60	4
MET116	Lithosphere Biosphere interface-Hydrosphere-Atmosphere / (Ecosystems and natural resources)	25	15	15	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MET117	Bilingual training	30	10	0	5	45	3
Total		**200**	**130**	**85**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		Specialty: Meteorology					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MET121	Physics of the Atmosphere	40	20	10	5	75	5
MET122	Regions and Territories of Cameroon	30	25	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MET123	Data systems for Acquisition of climatological and meteorological	25	15	15	5	60	4
MET124	Software Engineering and Database in Meteorology	20	25	10	5	60	4
MET125	Workshops and Internship of impregnation in meteorological station	20	15	20	5	60	4
MET126	Tropical Meteorology	40	30	15	5	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MET127	Creation of Business - Civic Education and Ethics	30	10	0	5	45	3
Total		**205**	**140**	**70**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Meteorology**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MET231	Administrative Law	30	25	0	5	60	4
MET232	Observation and measurement	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
MET233	WeatherForecast	35	25	10	5	75	5
MET234	Satellite Meteorology	30	20	20	5	75	5
MET235	Workshops on observation / Analysis /forecast	30	15	25	5	75	5
MET236	Weather Assistance	20	10	10	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MET237	Computer Science	30	5	5	5	45	3
Total		**215**	**120**	**80**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Meteorology**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MET241	Sociology of Environment and Development	45	25	0	5	75	5
MET242	Labor Law	35	20	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MET243	Workshops on analysis / forecast Weather	20	15	20	5	60	4
MET244	Workshopson observation / Climatology / Maintenance	20	15	20	5	60	4
MET245	Climatological Project	0	15	40	5	60	4
MET246	Professional Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MET247	Accounting and Economics	30	10	0	5	45	3
Total		**150**	**100**	**140**	**60**	**450**	**30**

5. Courses content

❖ MET 111: Statistics and Mathematics

- **Statistics: 2 credits (30 hours);L, T, SPW**

1. Descriptive statistics to a dimension
2. Linearregression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimating
7. Hypothesis Test of KHI-two

- **Mathematics: 3 credits (45 hours); L, T, SPW**

1. Functions of a real variable
2. Circular andhyperbolic functions and their reciprocals
3. Differential of a function
4. Differential Equations
5. Formula of Taylor and limited developments
6. Simple integrals and applications
7. Multiple integrals and applications to the calculation of surface area and volume
8. Numericalsequences
9. Numericalseries
10. The Fourier series
11. Laplace transformation
12. Fourier transform
13. Functions with several variables - scalar and vectors fields and a few applications

❖ MET 112: Initiation to the mapping and GIS

- **Initiation to the mapping and GIS: 4 credits (60 hours); L, T, P, SPW**

❖ MET 113: Climate change and natural hazards

- **Climate change and natural hazards: 5 credits (75 hours); L, T, SPW**

❖ MET 114: General and appliedHydrology

- **General and applied Hydrology : 5 credits (75 hours); L, T, P,SPW**

❖ MET115: General pedology

- **General pedology: 4 credits (60 hours); L, T, P, SPW**

❖ MET116: Interface Lithosphère-Biosphère-Hydrosphère-Atmosphère / (Ecosystems and natural resources)

- **Lithosphère-Biosphère interface-Hydrosphère-Atmosphère / (ecosystems and natural resources): 4 credits (60 hours); L, T, SPW**

❖ MET117: Bilingual training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**

- Vocabulaire des **activités agro-alimentaires**
- Vocabulaire des **actants**
- Vocabulaire des **affaires**

2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ MET 121: Physics of the atmosphere

- **Physics of the atmosphere: 5 credits (75 hours); L, T, P, SPW**

❖ MET 122: Regions and Territories of Cameroon

- **The regions and territories of Cameroon: 4 credits (60 hours); L, T, SPW**

❖ MET 123: Systems of acquisition of climatological data and + meteorological

- **Systems for Acquisition of climatological data and meteorological : 4 credits (60 hours); L, T, P, SPW**

❖ MET 124: Software Engineering and database in Meteorology

- **Software engineering and database in meteorology: credits (60 hours); L, T, P, SPW**

❖ MET 125:Workshops and Internship of impregnation in meteorological station

- **Workshops and Internship of impregnation in meteorological station : 5 credits (75 hours); L, T, P, SPW**

❖ MET 126: Tropical meteorology

- **Tropical meteorology: 5 credits (75 hours); L, T, P, SPW**

❖ MET 127: Creation of business, Civic Education and Ethics

- **Creation of business: 2 credits (30 hours); L, T, SPW**

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services
10. Human qualities

❖ MET 231: Administrative Law

- **Administrative Law: 4 credits (60 hours); L, T, SPW**

❖ MET 232: Observation and measurement

- **Observation and measurement: 5 credits (75 hours); L, T, SPW**

❖ MET 233: Forecast Weather Forecast

- **Weather Forecast: 5 credits (75 hours); L, T, P, SPW**

❖ MET 234: Satellite Meteorology

- **Satellite meteorology : 5 credits (75 hours); L, T, P, SPW**

❖ MET 235: Workshops of observation / Analysis forecast

- **The workshops of observation / Analysis / forecast: 5 credits (75 hours); L, T, P, SPW**

❖ MET 236: Weather Assistance

- **Weather assistance: 3 credits (45 hours); L, T, P, SPW**

❖ MET 237: Computer Science

- **Computer Science : 3 credits (45 hours); L, T, P, SPW**

❖ MET 241: Sociology of Environment and Development

- **Sociology of the environment and the development: 5 credits (75 hours); L, T, SPW**

❖ MET 242: Labour Law

- **Labor law: 4 credits (60 hours); L, T, SPW**

❖ MET 243: Workshops on analysis / forecast Weather forecast

- **Workshops on analysis / meteorological forecast: 4 credits (60 hours);L, T, P, SPW**

❖ MET 244: Workshops on observation / Climatology / Maintenance

- **The workshops on observation / Climatology / Maintenance: 4 credits (60 hours); L, T, P, SPW**

❖ MET 245: Climatological Project

- **Climatological project: 4 credits (60 hours); T, P, SPW**

❖ MET 246: Professional internship

- **Professional internship: 6 credits (90 hours); P, SPW**

1. Arrival and Business Integration
2. Working in a company
3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ MET 247: Accounting and Economics

- **Accounting: 2 credits (30 hours); L, T, SPW**

- **Economy: 1 credit (15 hours); L, T, SPW**

Field : ENVIRONMENTAL SCIENCES

Specialty :

SOLID WASTE MANAGEMENT

Field: ENVIRONMENTAL SCIENCES

Specialty: Solid Waste Management

1. The objective of the training

The objectives of this specialty is to develop an intensive training programme to standardise the professionals outcomes of waste operators, to provide a basis for operators training, evaluation of waste operator.

2. Skills sought after

→ **Generic Skills**

- Master the basic computer tools;
- Develop a professional attitude in the respect of deontology and ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

→ **Specific Skills**

- Develop different composting techniques, organisms for composting and the different types of composting systems;
- Develop skills in personnel development;
- Acquire techniques on the treatment of waste by incineration and thermal treatment;
- Analyze land filling system as a waste treatment method to the students;
- Diagnose and identify practical bottlenecks;
- Potential processing and storage contaminants;

3. Career opportunities

- Agriculture, Water and population management Ministries,
- Water management boards
- Hydro-electricity systems,
- Agro-industries
- Self- employment in water plumbing

4. Organization of teachings

- **FIRST SEMESTER**

Field of study: Environmental Sciences		Specialty: Solid Waste Management					
code	Course title	Number of Hours					Number of credits
		L	T	P	SPW	Total	
FUNDAMENTAL COURSES 30% (2 UC) 9 CREDITS 135 HOURS							
SWM111	Mathematics	45	20	5	5	75	5
SWM112	Physics	25	15	15	5	60	4
PROFESSIONAL COURSES 60%(4UC)18 CREDITS 270 HOURS							
SWM113	Principles of Solid Waste Management	30	20	5	5	60	4
SWM114	LandfillSystems	45	20	5	5	75	5
SWM115	Soil physics and soil treatment	30	20	5	5	60	4
SWM116	Typology of Solid Waste	45	20	5	5	75	5
Cross-Sectional Course 10% (1UC) 45 HOURS							
SWM117	Bilingual Training	30	10		5	45	3
TOTAL		**250**	**125**	**40**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field of study: Environmental Sciences		Specialty: Solid Waste Management					
code	Course title	Number of Hours					Number of credits
		L	T	P	SPW	Total	
FUNDAMENTAL COURSES 30% (2 UC) 9 CREDITS 135 HOURS							
SWM121	Statistics & Probability	45	20	5	5	75	5
SWM122	Chemistry	25	15	15	5	60	4
PROFESSIONAL COURSES 60%(4UC)18 CREDITS 270 HOURS							
SWM123	Collection, Transportation And Storage of Solid Waste	30	10		5	45	3
SWM124	Framework For Management of Solid Waste	30	20	5	5	60	4
SWM125	Processingof Solid Waste	45	20	5	5	75	5
SWM126	Internship1			60	30	90	6
Cross-Sectional Course 10% (1UC) 45 HOURS							
SWM127	Information Technology in Urban Waste Management	30	10		5	45	3
TOTAL		**205**	**90**	**95**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Solid Waste Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SWM231	Sanitation	30	25		5	60	4
SWM232	Management of Project	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SWM233	Treatment and Disposal of Solid Waste	30	20	5	5	60	4
SWM234	Composting of solidwaste	30	15	10	5	60	4
SWM235	Policy Alternatives For Improving Solid Waste Management	45	25		5	75	5
SWM236	Incinerationand Thermal Conversion	35	20	15	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SWM237	Labour Law/ Environmental Law	30	10		5	45	3
Total		**245**	**135**	**20**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Solid Waste Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SWM231	Sanitation	30	25		5	60	4
SWM232	Management of Project	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SWM233	Treatment and Disposal of Solid Waste	30	20	5	5	60	4
SWM234	Composting of solidwaste	30	15	10	5	60	4
SWM235	Policy Alternatives For Improving Solid Waste Management	45	25		5	75	5
SWM236	Incinerationand Thermal Conversion	35	20	15	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SWM237	Labour Law/ Environmental Law	30	10		5	45	3
Total		**245**	**135**	**20**	**35**	**450**	**30**

5. Courses content

❖ SWM 111: Mathematics

- **Mathematics: 5 credits (75 hours); L, T, P, SPW**

Objective: At the end of this course, students will be able to apply mathematics knowledge to agricultural production and business decisions.

Content:

1. Suites and actual series
2. Numerical Functions
3. Full calculation (primitives, surface integral and volume)
4. Differential Equation of the first and second-order
5. Use of computer tools for the resolution of equations
6. Vector space

❖ SWM 112: Physics

- **Physics: 4 credits (60 hours); L, T, P, SPW**

Objective: Teaching basic principles of force analyses in engineering systems

Contents:
Concept of measurement of mass, force, time and space, Systems of units, Fundamentals & Derived units, Conversion of units, required Accuracy of results, General Principles of Statics, Vector addition, Subtraction and Products, Resultant of Distributed (Linear & Non-linear) force Systems, General conditions of equilibrium of Co-planer forces, Laws of Triangle, Parallelogram and Polygon of forces, Types of beams, Supports and Loads, Simple cases of Axial forces, Shear forces and Bending Moment diagrams, Problem involving friction on Flat surfaces, Geometrical Properties of Plane Areas, Work, Energy, Power, Impulse, Momentum, Conservation of Momentum and Energy, Rectilinear and Curvilinear motions, Tangential and Normal Components of Acceleration, Simple Harmonic motion

❖ SWM 113: Principles of Solid Waste Management

- **Principles of Solid Waste Management: 4 credits (60 hours); L, T, P, SPW**

Objective: Characterization of wastes from point of production to final disposal.

Content:

1. Definition of waste/General categories of waste (solids, liquids/gasses)
2. Sources/Quantities and composition
3. Quantification procedures
4. Characteristics of waste

❖ SWM 114: Landfill systems

- **Landfill systems: 5 credits (75 hours); L, T, P, SPW**

Objective: Analyze land filling system as a waste treatment method to the students

Content:

1. Planning and programming for a landfill
2. Landfill processes
3. Biological, chemical and physical land filling process
4. Leachate collection and treatment

❖ SWM 115: Soil Physics and soil treatment

- **Soil Physics and soil treatment: 4 credits (60 hours); L, T, P, SPW**

Introduction: Definition of soil and its importance for plant growth. Composition and formation of soils. Soil classification & Horizons. Soil colour and temperature.

Soil physical properties: texture and structure, water content, bulk density, particle density, porosity, void ratio, saturation capacity.

Soil water Potential: components of total potential, measurements of potential components, capillary tube, tensiometer, piezometer tube.

Saturated water flow: Darcy's law, measurement of the saturated hydraulic conductivity in the lab and field.

Unsaturated water flow: retention curve and hydraulic conductivity function, measurement of retention curve, Richards equation, infiltration, evaporation, non-equilibrium/preferential flow.
Soil hydraulic parameters their measurements: VGM parameters and analytical models RETC, ROSETTA for measurement of hydraulic parameters. Introduction of numerical models (HYDRUS) for modeling of water flow in soil.

Soil contamination: Heavy metals contamination, hydrocarbon contamination, organic contamination, mineral contamination
Soil treatment and remediation: sequential extractions, physical separation, chemical processes.

❖ SWM 116: Typology of Solid Waste

- **Typology of Solid Waste: 5 credits (75 hours); L, T, P, SPW**

❖ SWM 117: Bilingual Training

➢ **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;

- Communication orale courante ;
- Communication orale interactive ;
- De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
- Lecture rapide et compréhension de texte ;
- Synthèse de texte
- De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
- Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
- Expressions figées

❖ SWM 121: Statistics & Probability

- **Statistics & Probability: 5 credits (75 hours); L, T, P, SPW**

Objective:
Students will learn relevant statistical tools and techniques to collect analyse and present data
Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Why study statistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphical methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location(central tendancy)
   - Measures of variability(dispersion)
   - Interpreting the standard deviation
   - Other numerical measures

5. **Simple linear regression and correlation**
   - Introduction
   - Some definitions
   - Scatter diagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ SWM 122: Chemistry

- **Chemistry: 4 credits (60 hours); L, T, P, SPW**

Mineral chemistry: Fundamental Concepts: Reminder of the notions of atom, molecule and mole ; Electro negativity of the elements, types of connections, isometry, nomenclature; Summary Study of elements of the blocks; Summary Study of elements of the block P; Summary Study of the transition elements.
Organic chemistry **:**Fundamental concepts; Metal networks; Ionic networks; Molecular networks; The main functions of the organic chemistry; Alkanes, cyclo-alkanes, alkenes, alkynes, aromatic; Halogen drifts; Organometallic drifts, alcohols, thiols, ether, oxides, thiothers and amines.

❖ SWM 123: Storage, Collection and Transportation of Solid Waste

- **Storage, Collection and Transportation of Solid Waste: 3 credits (45 hours); L, T, P, SPW**

Objective: Acquire skills in managing waste in our society.

Content:

1. Methods of reuse storage (individual, community, region and nation)
2. Collection methods i.e. door to door, collection depots etc etc.
3. Frequency of collection/ Basic collection systems
4. Waste transportation- manual and mechanized transport means
5. Hygiene/costs/legality

❖ SWM124: Framework for management of solid waste

- **Framework for management of solid waste :4 credits (60 hours); L, T, P, SPW**

Objective: Implement integrated waste management processes

Content:

1. Definition of integrated waste management
2. Elements of a waste management system
3. Integrated waste management
4. Costs/legality

❖ SWM 125: Processing of solid waste

- **Processing of solid waste: 5 credits (75 hours); L, T, P, SPW**

Objective: Enable students acquire the different techniques in processing waste from point of production.

Content:

1. Manual separation
2. Mechanical separation
3. Design of processing facility
4. Yard waste and food waste processing
5. Processing and recycling construction and demolition debris,
6. Recycling of valuable materials
7. Measurement methods for the analysis of odour, dust and germs
8. Physical and chemical analysis of solid waste
9. Design of Solid Waste Treatment Plants
10. Biotechnological waste treatment processes
11. Wastewater and sludge treatment

❖ SWM 126: Internship 1

- **Internship1: 6 credits (90 hours); P, SPW**

Objective: Acquire hands-on experience on the job

Content:

1. Spend a minimum of 30 days on a job of interest in a public or private setup
2. Participate with the institution's workers and work
3. Write a report on experiences gained and lessons learnt
4. Analysis of confidential report for enterprise
5. Grading of student report

❖ SWM 127: Use of Information Technology in Urban waste Management

- **Use of Information Technology in Urban waste Management: 3 credits (45 hours); L, T, SPW**

Objective: Computerization of pollution prevention and remediation processes

Content:

1. Software/hardware principles
2. Application in breeding
3. Application in proactive/reactive processes
4. Management use,

❖ SWM 231: Sanitation

- **Sanitation : 4 credits (60 hours); L, T, P, SPW**

❖ SWM 232: Management of Project

- **Management of Project: 5 credits (75 hours); L, T, P, SPW**

❖ SWM 233: Treatment and Disposal of Solid Waste

- **Treatment and Disposal of Solid Waste: 4 credits (60 hours); L, T, P, SPW**

Objective: to acquired the students with the appropriate measures of waste disposal

Content:

1. Introduction
2. Definition
3. Basic principles

❖ SWM 234: Composting of solid waste

- **Composting of solid waste: 4 credits (60 hours); L, T, P, SPW**

Objective: Develop different composting techniques, organisms for composting and the different types of composting systems

Content:

1. Definitions:
2. Biological treatments
3. Fermentation
4. Active organisms
5. Process factors
6. Composting Technology
7. Types of compost systems
8. Evolution of composting process
9. Marketing and distribution of compost
10. Thermal and mechanical properties of waste

❖ SWM 235: Policy alternatives for improving solid waste management

- **Policy alternatives for improving solid waste management: 5 credits (75 hours); L, T, P, SPW**

Objective: This course will be based on the policies and decisions that are made to effectively guide the management of solid waste.

Content:

1. Introduction
2. Decision-making
3. Waste avoidance
4. Legal framework
5. Political issues/will,

6. Human resource development in urban waste management (Admission requirement, Gender issues, Training modules, Training duration)
7. Environmental impact assessment of solid waste burial and cremation
8. The Hazardous Waste International Conventions
9. Waste management strategies

❖ SWM 236: Incineration and thermal conversion

- **Incineration and thermal conversion : 5 credits (75 hours); L, T, P, SPW**

Objective: Acquire techniques on the treatment of waste by incineration and the thermal treatment

Content:

1. Introduction
2. Principles of incineration
3. Types of incinerations,
4. Energy conversion and thermal station,
5. Incineration end member product management reuse

❖ SWM 241: Technical report writing

- **Technical report writing: 5 credits (75 hours); L, T, P, SPW**

❖ SWM 242: Health Security andEnvironment (HSE)

- **Health Security and Environment (HSE): 4 credits (60 hours); L, T, P, SPW**

❖ SWM 243: Industrial Burying of Solid Waste

- **Industrial Burying of Solid Waste : 4 credits (60 hours); L, T, P, SPW**

❖ SWM 244: Valuation of Solid Waste

- **Valuation of Solid Waste: 3 credits (45 hours); L, T, P, SPW**

❖ SWM 245: Hazardous Waste and Contaminated Sites

- **Hazardous Waste and Contaminated Sites: 5 credits (75 hours); L, T, P, SPW**

❖ SWM 246 : Internship II

- **Internship II: 6 credits (90 hours); P, SPW**

Objective: Find practical solutions to constraints on the job space

Content:

1. Spend a minimum of 30 days on the job in any private or public establishment
2. Diagnose and identify practical bottleneck
3. Apply possible solution (if possible) or suggest

❖ SWM 247 : Civic education and ethics

- **Civic education and ethics : 3 credits (45 hours); L, T, SPW**

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services
10. Human qualities

- **Environmental Law**

- **Labour Law**

Field : ENVIRONMENTAL SCIENCES

Specialty :

WILDLIFE MANAGEMENT

Field:	ENVIRONMENTAL SCIENCES

Specialty:	Wildlife Management (WIM)

1. The objective of the training

This specialty has for objective to train the learner to master, to the diagnosis and management of wildlife

2. Skills sought after

→ **General Skills**

- Master the tools of basic computing ;
- Develop a professional attitude in the respect of ethics ;
- Work as a team in a training environment and in the middle of the professional practice;
- To understand the operation of organizations;
- Work in a multicultural environment;
- Use the techniques of collection and processing of data;
- Progressively develop autonomy of learning in order to be able to continue in a way continues his personal and professional development throughout his career.

→ **Specific Skills**

- Perform the state of places of the forest; and
- Perform interventions for sustainable management in the forest or other wooded spaces;
- Put in place the planning of forest management, taking into account the mastery of the Territory and the forest policies;
- Make inventory and assess the stands;
- Predict the farm work and forestation;

3. Career opportunities

- Business Leader exploitation of forest resources;
- Technician of studies or research;
- The manager of a forest massif;

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		**Specialty: Wildlife Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WIM111	Biochemistry/Microbiology	50	10	10	5	75	5
WIM112	The Forest Governance in Cameroon	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
WIM113	TerrestrialEcosystem	30	15	10	5	60	4
WIM114	Wildlife Study Techniques	40	15	15	5	75	5
WIM115	Wildlife and Range Management	30	10	20	5	60	4
WIM116	Wildlife Capture Techniques	40	10	20	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WIM117	Bilingual Training	30	10	0	5	45	3
Total		**240**	**95**	**85**	**30**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		**Specialty: Wildlife Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WIM121	Mathematics	35	15	5	5	60	4
WIM122	Rights of Indigenous Peoples of the Forest Regions	45	15	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
WIM123	Museum and Herbarium Techniques	30	15	10	5	60	4
WIM124	Forest management	30	15	25	5	75	5
WIM125	Methods and Techniques of Analysis and Evaluation of Forests	40	10	20	5	75	5
WIM126	Tropical forests: Operation, Resources and Issues	30	20	10	0	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WIM127	Civic Education and Ethics	30	10	0	5	45	3
Total		**240**	**100**	**80**	**30**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Wildlife Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WIM231	Statistics and Probability	40	15	0	5	60	4
WIM232	Certification and sustainable management of forests	50	20	0	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
WIM233	Game Protection and Utilization	35	15	5	5	60	4
WIM234	Wildlife Population Dynamics	40	15	15	5	75	5
WIM235	Equipment and management of Forest Shipyards	40	15	15	5	75	5
WIM236	Zoo and Park Management	40	20	0	0	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WIM237	Use of Information Technology in Wildlife	20	15	10	0	45	3
Total		**265**	**115**	**45**	**25**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Wildlife Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WIM 241	Negotiation Techniques and of Intermediation	40	20	10	5	75	5
WIM242	The Right to the Environment and Sustainable Development	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
WIM 243	Ornithology	30	15	10	5	60	4
WIM244	Wildlife Management and Conservation	40	10	20	5	75	5
WIM 245	Ecology and Management of Large African Mammals	25	15	0	5	45	3
WIM 246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WIM 247	Mounting Techniques of Project	30	5	5	5	45	3
Total		**195**	**80**	**115**	**60**	**450**	**30**

5. Courses content

❖ WIM 111: Biochemistry/Microbiology

- **Introduction to Biochemistry: 4 credits (60 hours); L, T, P, SPW**

Objectives

- Students should understand the structure, function, properties and metabolism of biomolecules in plants and animals
- Students should understand the relevance of biochemistry and its application in plants and animal production and technology

1. Protein, Amino Acids, And Peptides
2. Carbohydrates
3. Lipids
4. Nucleic Acids and Nucleotides
5. Enzymes
6. Introductions to Metabolism
7. Energy Transfer Process
8. Metabolism of Carbohydrate

- **Introduction to Microbiology: 4 credits (60 hours); L, T, SPW**

Objectives: To permit the trainees to acquire the knowledge and master how to determine pathological micro-organisms of plants and domestic animals.

1. Definition
2. Classification of microorganisms
3. Methods of classification
4. Bacteria
5. Mycoplasmas
6. Rickettsiae
7. Fungi
8. Viruses

❖ WIM 112: Forest governance in Cameroon

- **The forest governance in Cameroon: 4 credits (60 hours); L, T, SPW**

1. Principles of Governance
2. The international instruments of reference
3. Legal and institutional framework of forestry in Cameroon
4. The actors and the rules of access to forest resources
5. The state of place of forest governance: transgressions, violation of the texts, poaching, non-compliance with specifications

❖ WIM 113: Terrestrial and Aquatic Ecosystems

- **Terrestrial and Aquatic Ecosystems: 4 credits (60 hours); L, T, P, SPW**

1. The ecologicalfactors
2. GeographicFactors

❖ WIM 114: Wildlife Study Techniques

- **Wildlife Study Techniques Tropical forest: 5 credits (75 hours); L, T, P, SPW**

1. Wildlife census methods
2. Determination of age, sex and home range
3. Capture and marketing of wildlife

❖ WIM 115: Wildlife and Range Management

- **Wildlife and Range Management: 4 credits (60 hours); L, T, P, SPW**

1. Wildlife stock assessment
2. National parks and game reserves organisation and administration
3. Control of animal populations and anti-poaching exercise,

❖ WIM 116: Wildlife Capture Techniques

- **Wildlife Capture Techniques: 5 credits (75 hours);L, T, P, SPW**

1. Practical methods of immobilizing wildlife
2. Handling and care of captured wildlife
3. Non-chemical techniques to capture wildlife
4. Marketing capture animals

❖ WIM 117: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;

- Browse a text long enough to locate desired information;
- Gather information from different parts of the document or of the different documents in order to accomplish a specific task.

5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ WIM 121:Mathematics

- **Mathematics: 4 credits (60 hours); L, T, SPW**

Objectives

Atthe end of this course, student will be able to apply mathematics knowledge to agricultural production and business decisions.

1. **Importance of agricultural mathematics to students**
2. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negativenumbers
3. **Use of measures on the farm**
   - Linearmeasures
   - Square measure (area)
   - Cubicmeasure (volume)
   - Square roots
4. **Weights and their use**
5. **Trigonometriccalculations**
6. **Measurement conversions**

❖ WIM 122: Rights of Indigenous Peoples of the forest regions

- **Rights of Indigenous Peoples of the forest regions: 5 credits (75 hours); L, T, P, SPW**

1. Definition of the concept "indigenous peoples"
2. Location and spatio-temporal dynamics of indigenous peoples
3. International and national instruments dealing with Aboriginal peoples
4. Critical analysis of the rights of indigenous peoples
5. Case studies of conflicts between forest operators and indigenous peoples
6. Participatory tools of communication with Aboriginal peoples

❖ WIM 123: Museum and Herbarium Techniques

- **Museum and Herbarium Techniques : 4 credits (60 hours); L, T, P, SPW**

❖ WIM 124: Forest Management

- **Forest Management: 5 credits (75 hours); L, T, P, SPW**

❖ WIM 125: Methods and techniques of analysis and evaluation of forests

- **Methods and techniques of analysis and evaluation of forests: 5 credits (75 hours); L, T, P, SPW**

1. General principles of Forest analysis
2. Methods of timber evaluation
3. Statistical techniques applied to the analysis of forests
4. Methods of wildlifeinventory
5. Introduction to the forest information system
6. The main components of the value of forest

❖ WIM 126: Tropical forests: operation, resources and Issues

- **Tropical forests: operation, resources and issues II: 4 credits (60 hours);L, T, P, SPW**

1. tropical forests in the environmental, economic and socio-culturalimportance
2. Deforestation and the strategies for the conservation of tropical forests
3. The dynamics of the forest canopy of Cameroon

❖ WIM 127: Civic Education and Ethics

- **Civic Education and Ethics: 3 credits (30 hours); L, T, SPW**

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education
5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. Profession / Vocation
9. Good governance in public services
10. Human qualities

❖ WIM 231:Statistics and Probability

- **Statistics and Probability: 4 credits (60 hours); L, T, P, SPW**

Objective:
Students will learn relevant statistical tools and techniques to collect, analyse and present data
Students gain knowledge on how to design exploratory and secondary research as well as data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Why study statistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Other numerical measures
5. **Simple linear egression and correlation**
   - Introduction
   - Some definition
   - Scatter diagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ WIM232: Certification and sustainable management of forests

- **Certification and sustainable management of forests: 5 credits (75 hours); L, T, P, SPW**
  1. Forest certification: Genesis, concepts, principles and objectives

2. The main steps of the adoption of forest certification in Cameroon
3. The types of forest certification: comparative analysis
4. The certification process
5. The issues of certification
6. The fate of certification

❖ WIM 233: Game Protection and Utilization

- **Game Protection and Utilization : 4 credits (60 hours); L, T, P, SPW**

1. Traditional use of wildlife and wildlife products
2. Wildlife production, harvesting and Hunting techniques

❖ WIM 234: Wildlife Population Dynamics

- **Wildlife Population Dynamics: 5 credits (75 hours); L, T, P, SPW**

1. Methods used to determine changes in wildlife abundance
2. Determination of population size and growth for wildlife

❖ WIM 235: Equipment and management of forest shipyards

- **Equipment and management of forest shipyards: 5 credits (75 Hours); L, T, P, SPW**

❖ WIM 236:Zoo and park management

- **Zoo and park management : 4 credits (60 hours); L, T, P, PW**

❖ WIM 237:Use of Information technology in Wildlife

- **Use of Information technology in Wildlife: 3 credits (45 hours); L, T, SPW**

1. Software/hardware principles
2. Application in breeding
3. Application in proactive/reactive processes
4. Management use

❖ WIM 241:Techniques of negotiation andIntermediation

- **Techniques of Negotiation and mediation: 5 credits (75 hours);L, T, P, SPW**

1. The principles of the alternative conflict management.
2. The specificity of conflicts related to the management of natural resources
3. The tools of a conflict analysis

4. Analysis of the causes of the conflict
5. Identification and analysis of stakeholders
6. Case Study of the stages of the negotiations and the drafting of agreements Case Study

❖ WIM 242: Right to the environment and sustainable development

- **The right to the environment and sustainable development: 4 credits (60 hours); L, T, P, SPW**

❖ WIM 243:Ornithology

- **Ornithology: 4 credits (60 hours); L, T, P, SPW**

1. Classification, structure and ecology of birds
2. Economic importance of birds
3. The avifauna of Cameroon

❖ WIM 244: Wildlife Management and Conservation

- **Wildlife Management and Conservation I: 5 credits (75 hours);L, T, P,S PW**

1. Wildlife values and national conservation objectives
2. Techniques for wildlife management for specific objectives
3. Problems of wildlife conservation in Cameroon

❖ WIM 245: Ecology and Management of Large African Mammals

- **Ecology and Management of Large African Mammals : 3 credits (45 hours); L, T, SPW**

1. General principles of large mammal management
2. Taxonomy, ecology and strategies for management of large African mammals

❖ WIM 246:Professional internship

- **Professional internship: 6 credits (90 hours); P, SPW**

1. Working in a company
2. Holding of the Intern journal
3. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
4. Elaboration of the canvas of research
5. Resources to exploit
6. Organization of work
7. Drafting of the report

❖ WIM 247: Mounting Techniques of Project

- **Technique of mounting of projects: 3 credits (45 hours); L, T, P, SPW**

1. The basic principles of the mounting of the projects
2. The types of Project
3. The Prerequisites
4. The process of developing the project cycle
5. The fundamentalprinciples (relevance, scope, rational)
6. The chronogram and indicators (follow-up of performance, impacts)
7. The Financial mounting

Field : ENVIRONMENTAL SCIENCES

Specialty :

ENVIRONMENTAL IMPACT ASSESSMENT

Field: ENVIRONMENTAL SCIENCES

Specialty: Environmental Impact Assessment (EIA)

1. The objective of the training

- To produce competent professionals with key skills adequate to solve practical problems relating to environmental impacts of development activities,
- To enhance students' knowledge and practical skills in the techniques of assessing environmental impacts of development projects.
- To increase knowledge through conduct of basic and adaptive research.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knowledge in :

- Basic Physics, Chemistry, mathematics, mechanics, electricity, Computer Science processes, environment laws and legislation

→ **Specific Skills**

- Develop a vision and passion for the techniques of assessing environmental impacts of development projects.
- Solve practical problems relating to environmental impacts of development activities,
- Knowledge and practical skills in the techniques of assessing environmental impacts of development projects.

3. Career opportunities

Graduates can aspire for the following responsibilities and job opportunities in both the Public and Private Sector businesses, and Not-for-Profit organizations:

- EIA experts (engineers and technicians):
- EIA practitioner's
- Environmental managers.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		Specialty: Environmental Impact Assessment (EIA)					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
EIA111	Engineering Mathematics I	30	20	5	5	60	4
EIA112	Engineer in the Society	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
EIA113	Environmental Policy&Ethics	30	15	10	5	60	4
EIA114	Sustainability, Population and Sustainable Development Practices	45	20	5	5	75	5
EIA115	Evolution&Ecology	45	15	10	5	75	5
EIA116	Science &Policies of Climate Change	30	20	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
EIA117	Bilingual Training	30	10	-	5	45	3
Total		**255**	**115**	**45**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		Specialty: Environmental Impact Assessment (EIA)					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
EIA121	Engineering Mathematics II	30	25		5	60	4
EIA122	Fluid Mechanics	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
EIA123	GIS and Remote Sensing	30	15	10	5	60	4
EIA124	Introduction to EIA	30	15	25	5	75	5
EIA125	EnvironmentalResearchMethods	25	10	15	10	60	4
EIA126	Short Internship Report	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
EIA127	Computer Programming	30	10		5	45	3
Total		**210**	**100**	**80**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Environmental Impact Assessment (EIA)**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
EIA 231	Engineering Mathematics III	25	15	15	5	60	4
EIA 232	Statistics and Probability	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
EIA 233	Understanding EIA & SEA	30	15	10	5	60	4
EIA 234	Achieving full Potential of Social Impact Assessment	45	25		5	75	5
EIA 235	Mainstreaming Biodiversity in Energy Projects	45	25		5	75	5
EIA 236	Mitigation, Monitoring, Follow-Up in EIA	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
EIA 237	Civic education and ethics/ Environmental law and Labour Law	30	10		5	45	3
Total		**265**	**125**	**35**	**45**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Environmental Impact Assessment (EIA)**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
EIA 241	Cameroon environmental Law, Natural Resource Policy	40	20	10	5	75	5
EIA 242	Engineering Mathematics IV	30	25	-	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
EIA 243	EnvironmentalRiskAssessment& Adaptive Management	20	15	20	5	60	4
EIA 244	Theory & Practice of multi-criteria analysis for EIA	30	10	-	5	45	3
EIA 245	Case Study	45	25	-	5	75	5
EIA 246	Internship	-	-	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
EIA 247	Computer for business	30	10	-	5	45	3
Total		**195**	**95**	**90**	**60**	**450**	**30**

5. Courses content

❖ EIA 111: Engineering Mathematics I

- **Engineering Mathematics I: 4 credits (60 hours); L, T,P, SPW**

Objectives: at the end of this course the student should understand basic equations'master numerical methods solve statistical problems

1. Linear equations, differentiation, integration, geometric equations
2. Differentiation: rolle's Theorem and the man-value theorems, Taylor's theorem, Repeated Differentiation, Applications for Differentiation, Indeterminate form; Vector algebra and its application.
3. Laplace, Fourier, partial differentiation equations, arbitrary constants and arbitrary functions.

❖ EIA 112: Engineer in the society

- **Engineer in the society: 5 credits (75 hours); L, T, P, SPW**

Objectives: at the end of this course students should:

1. Understand basic principles, techniques and practice of management, entrepreneurship law and economics
2. Introduction
3. Historicalevolution of engineering
4. Career orientation on various engineering fields
5. Initiation and interpretation of administrative letters
6. Engineering and environmental pollution
7. Managing change
8. Organizational behavior, positive self-talk, managing stress
9. The industry and industrialpsychology
10. Engineering contracts
11. Tendering for public contracts
12. Specificationswriting
13. Law (tort, contract)
14. Organizational set up
15. Setting up an Enterprise

❖ EIA 113: Environmental Policy & Ethics

- **Environmental Policy &Ethics: 4 credits (60 hours); L, T, P, SPW**

Objectives and content: This course is an introduction to currently relevant domestic and international environmental policy. Topics include the scientific fundamentals for

existing environmental regimes, environmental economics, the environmental law itself and some discussion of application. It explores policy responses to significant local and global environmental problems, such as biodiversity loss, fisheries, clean air and water, and climate change. The central purpose will be to build literacy and analytical capacity for the existing portfolio of environmental regimes, both domestic and international.

Ethics

Objectives and content: This course examines the morality of our treatment of the environment. Investigates questions of ethical theory, such as: do we have moral obligations to animals, plants, species, and ecosystems? And do we ever have a right, or duty, to harm or kill some human or nonhuman animals in order to benefit or save others? Apply these ideas to environmental questions, such as: do we have a duty to conserve or preserve natural resources or the wilderness? And do we have a duty not to contribute to pollution or climate change?

❖ EIA 114:Sustainability, Population and Sustainable Development Practices

- **Sustainability, Population and sustainable development practices: 5 credits (75 hours); L, T, P, SPW**

❖ EIA 115: Evolution & Ecology

- **Evolution &Ecology: 4 credits (60 hours); L, T,P, SPW**

Objectives: This course explores the history of evolutionary thought and science to gain a conceptual overview of evolution.

Learn how and why species change over time, why some species survive while others go extinct, and what modern genetics may reveal about human evolution. Basic concepts in ecology which include ecosystem, energy flow, food chain/food web, trophic level, biogeochemical cycles, diversity, carrying capacity, limiting factors and ecological succession. Basic principles in sustainable development, six tests of sustainability's in the projects level and pillars of sustainable development

❖ EIA 116: Science & Policies of Climate Change

- **Science & Policies of Climate Change: 5 credits (75 hours);L, T,P, SPW**

Objective: The course aims to introduce the underlying science of human-induced and naturally-occurring climate change examines predictive models of climate change and projected impacts.

Content: Climate change impacts and adaptation, climate prediction models, feedback processes and uncertainties, costs and benefits of climate change impacts, adaptation and response measures, relationship between climate change science,

policy and economics; existing policies (Kyoto Protocol and IPCC reports), other possible technological, economic and command-and-control options, potential policies to deal with consumption and population growth.

❖ EIA117: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;

- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ EIA 121: Engineering Mathematics II

- **Engineering Mathematics II: 4 credits (60 hours); L, T,P, SPW**

Finite differences: Difference tables, forward, backward and central differences; Linear systems: Matrix methods, Gaussian elimination. Gauss-Seidel, ill–conditioning; Errors: Sources, estimates, propagation, floating point arithmetic; Operators; Curve fitting; Interpolation: Lagrange, Newton's forward and backward; Euler and Runge-Kuta methods; Collation polynomials; Newton-Raphson

❖ EIA 122: Fluid Mechanics

- **Fluid Mechanics: 5 credits (75 hours); L, T, P, SPW**

Fundamental concepts in fluid mechanics; Characteristics and properties of fluid; Fluid statics: Basic equation of hydrostatics, pressure distribution in a static and constant accelerating fluid, hydrostatic force on plane and curved surfaces immersed in static fluid, floating bodies and buoyancy, continuity equation (differential and integral form); Kinematics of fluid motion: Velocity, acceleration, streamlines, stream-tubes, particle paths, streak lines; Definition of irrotational and rotational flow; Circulation; Stream function and velocity potential function for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ EIA 123: GIS and Remote Sensing

- **GIS and Remote Sensing: 4 credits (60 hours); L, T, PW**

Objective and Content: This course focuses on the GIS principles, methods, and techniques relevant and useful for problem solving in environmental analysis and management. It looks at GIS principles; data models, scale and spatial sampling, and spatial autocorrelation; a review of the major techniques or issues for environmental data acquisition and integration; an introduction to environmental analysis and modelling techniques; environmental modelling techniques as related to landscape ecology, hydrology, natural hazards, natural resources management, and environmental planning.

❖ EIA 124: Introduction to EIA

- **Introduction to EIA:5 credits (75 hours); L, T,P,SPW**

Objective: To introduce the students to EIA, the methodologies and approaches that can be used for impact assessment and to drill students on project management and working in a team

Content: Goals, principles, purpose, functions of EIA. EIA in development planning, EIA process and role of EIA in project development. Legal and administrative frameworks, EIA procedural flow, Cameroon EIA System, Environment Compliance Certificate (ECC), public participation in EIA.

❖ EIA 125: Environmental Research Methods

- **Environmental Research Methods: 4 credits (60 hours); L, T,P,SPW**

Objectives and Content: This course introduces students to basic research methods and internship reporting. It includes; sampling techniques and procedure, various techniques statistical analysis of data including some software programs. It also looks at guides to report research, internship and experiments. Finally it trains students on proposal writing.

❖ EIA 126: Short Internship Report

- **Short Internship Report: 5 credits (75 hours); L, T,P,SPW**

Objective: To enable the student to be acquainted with the industrial milieu, acquire more knowledge experience in a different environment
Content: Industrial integration. The student is followed up during this period both by a senior instructor in the industry and an academic supervisor.

❖ EIA 127: Computer Programming

- **Computer Programming: 3 credits (45 hours); L, T,P,SPW**

Generalities on Programming ,Delphi and Visual Basic Programming: Visual Basic concepts, Designing programs, Program Flow, Testing and Debugging, Functions, Arrays, Interacting with the user, Interacting with the system; Mastering of professional Software; Algorithms

❖ EIA 231: Engineering Mathematics III

- **Engineering Mathematics III: 4 credits (60 hours); L, T,P,SPW**

1. matrix theory, differential calculus
2. first order differential equations
3. linear differential equations of higher order
4. Laplace transformation, integral calculus, vector calculus
5. Fourier series and transformations, Z-transform, partialdifferential equation, complex variables and mapping,
6. special functions(bassel function, splines and Legendre)
7. statistical and numerical methods, statistics and probability
8. numerical analysis, series and sequences, linear programming

❖ EIA 232: Statistics and Probability

- **Statistics and Probability: 5 credits (75 hours);L, T,P,SPW**

Introduction to probability; Random variables and functions of random variables; Mathematical expectations and moments; Special discrete and continuous distribution: binomial, exponential, gamma, chi-square, t- and F- sums of random variables Law of large numbers; Central limit theorem

❖ EIA 233: Understanding EIA & SEA

- **Understanding EIA & SEA: 4 credits (60 hours); L, T,P,SPW**

Objective and Content: This course is aim at enabling students have an understanding of EIA and SEA. It focuses on principles and techniques and involves, emerging trends and cumulative effects of EIA/SEA. EIA processes which include the screening, scoping, description of environmental setting, steps in EIA study, etc. and methodologies, such as checklist, matrices, networks, models, etc., criteria for evaluation of EIA methodologies and public participation in environmental decision - making. Identification, prediction and assessment of the environmental impacts on natural resources such as air, water, soil, noise, plant and animal ecology, human health.

❖ EIA 234:Achieving full potential of social impact Assessment

- **Achieving full potential of social impact Assessment: 5 credits (75 hours); L, T,P,SPW**

Objective: The student will understand principles and theories of social impact assessment in the lectures and demonstrate principles presented with practical assessment

Content: Importance, salient points, process, methodologies, and tools needed for Social Impact Assessment., cultural heritage component in EIA, practical SIA carried out in an assigned project.

❖ EIA 235: Mainstreaming biodiversity in energy projects

- **Mainstreaming biodiversity in energy projects: 5 credits (75 hours); L, T,P,SPW**

Objectives and Content: Aim at using EIA to protect biological species in energy projects. The course shall look at energy projects and their effects on biodiversity, and how EIA can act like a medium to project species and ensure species diversity amidst energy projects.

❖ EIA 236:Mitigation, Monitoring, Follow-Up in EIA

- **Mitigation, Monitoring, Follow-Up in EIA: 4 credits (60 hours); L, T,P,SPW**

Objectives and Content:

Compliance monitoring, enforcement and permits needed by the different types of projects. Guidelines of Environmental Guarantee Fund. Impact management which include mitigation and enhancement plan, compensation plan, contingency plan and monitoring strategies.

Give students an understanding of the structure of the EIA report, environmental statement; TOR; students shall gain both theoretical and practical concepts.

❖ EIA 237: Civic education and ethics and Law

- **Civic education and ethics: 3 credits (45 hours); L, T,SPW**

1. Definition of:
   - Ethics
   - Civics
   - Deontology
   - Human rights
2. Foundation of ethics
3. General and Professional ethics
4. Deontology in education

5. Moral consciousness
6. Universal declaration of Human Rights
7. Protection of the environment
8. 8. Profession / Vocation
9. Good governance in public services
10. Human qualities

- **Environmental Law**

- **Labour Law**

❖ EIA 241:Cameroon environmental Law, Natural Resource Policy

- **Cameroon environmental Law, Natural Resource Policy: 5 credits (75 hours); L, T, P, SPW**

Objective Content: To enable students get in depth knowledge and skills on the application of environmental regulations in EIA. It shall examine all the environmental legislation/regulations in Cameroon including international treaties that Cameroon is signatory to.

Natural Resource Policy

Objective and Content: This course will focus on two major aspects of natural-resource management: biodiversity protection and public lands such as national parks and wilderness areas both nationally and internationally. Class sessions will include critical examinations of current law and policy and in-depth discussions of situational case studies that force you to consider how you would resolve real-life issues. Historical and philosophical basis for and principal laws relating to forest, wildlife and related resources; roles of science and values in natural resources policy making; the policy process; the main federal and state renewable resource management agencies; ethics and professionalism.

❖ EIA 242: Engineering Mathematics IV

- **Engineering Mathematics IV: 4 credits (60 hours); L, T,P, SPW**

1. matrix theory, differential calculus
2. first order differential equations
3. linear differential equations of higher order
4. Laplace transformation, integral calculus, vector calculus
5. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
6. special functions(bassel function, splines and Legendre)
7. statistical and numerical methods, statistics and probability
8. numerical analysis, series and sequences, linear programming

❖ EIA 243: Environmental Risk Assessment & Adaptive Management

- **Environmental Risk Assessment & Adaptive Management: 4 credits (60 hours); L, T, P, SPW**

Objectives and Content: Purpose, uses, importance and steps in ERA and adaptive measurement. ERA process and risk management.

❖ EIA 244: Theory & Practice of multi-criteria analysis for EIA

- **Theory & Practice of multi-criteria analysis for EIA: 3 credits (45 hours);L, T,P,SPW**

Objectives and Content: Enrich students with theoretical knowledge and practical skills in carrying outmulti-criteria analysis for EIA. The scope and process, and techniques used in multi-criteria analysis and field experience.

❖ EIA 245: Case Study

- **Case Study: 5 credits (75 hours); L, T, P, S PW**

Objective: Study visits to model projects and proposed projects. Preparation and submission of environmental impact assessment statement.

❖ EIA 246: Internship

- **Internship: 6 credits (90 hours); P, SPW**

Objective: This course is to provide an opportunity for students to undertake an in-depth research investigation in one of the areas covered by the Programme and Specialization.

Content: Final year students will carry out project work. The project should belong to one or more of the following areas: computing and analysis; design; laboratory investigation; field testing and instrumentation; case studies. The project duration is over the entire second semester. An individual formal report is required. Each student is required to make an oral presentation.

❖ EIA 247: Computer for business

- **Computer for business: 3 credits (45 hours); L, T, P, SPW**

1. Revision on; -MS word -MS excel –MS power point -MS Access
2. Office Automation
3. Graphics and graphing packages
4. Internet Working
5. Information Services

Field : ENVIRONMENTAL SCIENCES

Specialty :

FORESTRY ENGINEERING

Field: ENVIRONMENTAL SCIENCES

Specialty: Forestry Engineering

1. The objective of the training

- To produce competent professionals with key skills adequate to solve practical problems relating to forestry in both the Public and Private Sector businesses and Not-for-Profit organizations,
- To enhance students' knowledge and practical skills in sustainable forest exploitation and conservation techniques
- To increase knowledge through conduct of basic, and adaptive research.

2. Skills sought after

→ **General Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

Knowledge in:

- Basic Physics, Chemistry, mathematics, mechanics, electricity, Industry, Computer Science processes, environment laws and legislation

→ **Specific Skills**

- Develop a vision and passion to solve practical problems relating to forestry in both the Public and Private Sector
- Knowledge and practical skills in sustainable forest exploitation and conservation techniques

3. Career opportunities

Graduates can aspire for the following responsibilities and job opportunities in both the Public and Private Sector businesses, and Not-for-Profit organizations:

- EIA experts (engineers and technicians):
- EIA practitioners
- Environmental managers.

4. Organization of teachings

- **FIRST SEMESTER**

Field: Environmental Sciences		**Specialty: Forestry Engineering**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOE111	Engineering Mathematics I	30	20	5	5	60	4
FOE112	Engineer in the society	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOE113	Environmental Policy, &Ethics	30	15	10	5	60	4
FOE114	Sustainability, Population and Sustainable Development Practices	45	20	5	5	75	5
FOE115	Evolution&Ecology	45	15	10	5	75	5
FOE116	Science &Policies of Climate Change	30	20	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOE117	Bilingual Training	30	10	-	5	45	3
Total		**255**	**115**	**45**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: Environmental Sciences		**Specialty: Forestry Engineering**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOE121	Engineering Mathematics II	30	25		5	60	4
FOE122	fluid mechanics	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOE123	GIS and Remote Sensing	30	15	10	5	60	4
FOE124	Introduction to EIA	30	15	25	5	75	5
FOE125	EnvironmentalResearchMethods	25	10	15	10	60	4
FOE126	Short Internship Report	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOE127	Computer Programming	30	10		5	45	3
Total		**210**	**100**	**80**	**60**	**450**	**30**

- **THIRD SEMESTER**

Field: Environmental Sciences		**Specialty: Forestry Engineering**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOE231	Engineering Mathematics III	25	15	15	5	60	4
FOE232	Statistics and Probability	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
FOE233	Dendrology&TimberHarvesting	30	15	10	5	60	4
FOE234	Forest Insects & Diseases, Forest Biometrics	45	25		5	75	5
FOE235	ForestSoil Science	45	25		5	75	5
FOE236	Forest Ecology &Silviculture	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOE237	Civic education and ethics/ Law	30	10		5	45	3
Total		**265**	**125**	**35**	**45**	**450**	**30**

- **FOURTH SEMESTER**

Field: Environmental Sciences		**Specialty: Forestry Engineering**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
FOE241	Engineering Mathematics IV	40	20	10	5	75	5
FOE242	Cameroon Forestry and Wild Life Law, Natural Resource Policy	30	25	-	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
FOE243	Field Techniques in Ecology & Natural Resources	20	15	20	5	60	4
FOE244	Forest Resources, Management & Conservation Techniques	30	10	-	5	45	3
FOE245	Case Study	45	25	-	5	75	5
FOE246	Internship	-	-	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
FOE247	Engineering management	30	10	-	5	45	3
Total		**195**	**95**	**90**	**60**	**450**	**30**

5. Courses content

❖ FOE 111: Engineering Mathematics I

- **Engineering Mathematics I: 4 credits (60 hours); L, T, P, SPW**

Objectives: at the end of this course the student should understand basic equations master numerical methods and solve statistical problems

1. Linear equation, differentiation, integration, geometric equations
2. Differentiation: rolle's Theorem and the man-value theorems, Taylor's theorem, Repeated Differentiation, Applications for Differentiation, Indeterminate form; Vector algebra and its application and its application.
3. Laplace, Fourier, partial differentiation equations, arbitrary constants and arbitrary functions.

❖ FOE 112: Engineer in the Society

- **Engineer in the society: 5 credits (75 hours); L, T, P, SPW**

Objectives: at the end of this course students should:

1. Understand basic principles, techniques and practice of management, entrepreneur ship law and economics
2. Introduction
3. Historical evolution of engineering
4. Career orientation on various engineering fields
5. Initiation and interpretation of administrative letters
6. Engineering and environmental pollution
7. Managing change
8. Organizational behavior, positive self talk, managing stress
9. The industry and industrial psychology
10. Engineering contracts
11. Tendering for public contracts
12. Specifications writing
13. Law (tort, contract)
14. Organizational set up
15. Setting up an Enterprise

❖ FOE 113: Environmental Policy&Ethics

- **Environmental Policy &Ethics: 4 credits (60 hours); L, T, P, SPW**

Objectives and content: This course is an introduction to currently relevant domestic and international environmental policy. Topics include the scientific fundamentals for existing environmental regimes, environmental economics, the environmental law itself and some discussion of application. It explores policy responses to significant local and global environmental problems, such as biodiversity loss, fisheries, clean air and water, and climate change. The central purpose will be to build literacy and analytical capacity for the existing portfolio of environmental regimes, both domestic and international.

Ethics

Objectives and content: This course examines the morality of our treatment of the environment. Investigate questions of ethical theory, such as: Do we have moral obligations to animals, plants, species, and ecosystems? And do we ever have a right, or duty, to harm or kill some human or nonhuman animals in order to benefit or save others? Apply these ideas to environmental questions, such as: Do we have a duty to conserve or preserve natural resources or the wilderness? And do we have a duty not to contribute to pollution or climate change?

❖ FOE 114:Sustainability, Population and Sustainable Development Practices

- **Sustainability, Population and sustainable development practices: 5 credits (75 hours); L, T, P, SPW**

❖ FOE 115: Evolution&Ecology

- **Evolution &Ecology: 4 credits (60 hours); L, T, P, SPW**

Objectives: This course explores the history of evolutionary thought and science to gain a conceptual overview of evolution.

Learn how and why species change over time, why some species survive while others go extinct, and what modern genetics may reveal about human evolution. Basic concepts in ecology which include ecosystem, energy flow, food chain/food web, trophic level, biogeochemical cycles, diversity, carrying capacity, limiting factors and ecological succession. Basic principles in sustainable development, six tests of sustainability in the projects level and pillars of sustainable development

❖ FOE 116: Science & Policies of Climate Change

- **Science & Policies of Climate Change: 5 credits (75 hours); L, T, P, SPW**

Objective: The course aims to introduce the underlying science of human-induced and naturally-occurring climate change examines predictive models of climate change and projected impacts.
Content: Climate change impacts and adaptation, climate prediction models, feedback processes and uncertainties, costs and benefits of climate change impacts, adaptation and response measures, relationship between climate change science, policy and economics; existing policies (Kyoto Protocol and IPCC reports), other possible technological, economic and command-and-control options, potential policies to deal with consumption and population growth.

❖ FOE 117: Bilingual Training

- **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

1. **Vocabulaire**
   - Vocabulaire technique usuel
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ FOE 121: Engineering Mathematics II

- **Engineering Mathematics II: 4 credits (60 hours); L, T, P, SPW**

Finite differences: Difference tables, forward, backward and central differences; Linear systems: Matrix methods, Gaussian elimination. Gauss-Seidel, ill–conditioning; Errors: Sources, estimates, propagation, floating point arithmetic; Operators; Curve fitting; Interpolation: Lagrange, Newton's forward and backward; Euler and Runge-Kuta methods; Collation polynomials; Newton-Raphson

❖ FOE 122:Fluid Mechanics

- **Fluid Mechanics: 5 credits (75 hours); L, T, P, SPW**

Fundamental concepts in fluid mechanics; Characteristics and properties of fluid; Fluid statics: Basic equation of hydrostatics, pressure distribution in a static and constant accelerating fluid, hydrostatic force on plane and curved surfaces immersed in static fluid, floating bodies and buoyancy, continuity equation (differential and integral form); Kinematics of fluid motion: Velocity, acceleration, streamlines, stream-tubes, particle paths, streak lines; Definition of irrotational and rotational flow; Circulation; Stream function and velocity potential function for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ FOE 123: GIS and Remote Sensing

- **GIS and Remote Sensing: 4 credits (60 hours); L, T, P, SPW**

Objective and Content: This course focuses on the GIS principles, methods, and techniques relevant and useful for problem solving in environmental analysis and management. It looks at GIS principles; data models, scale and spatial sampling, and spatial autocorrelation; a review of the major techniques or issues for environmental data acquisition and integration; an introduction to environmental analysis and modelling techniques; environmental modelling techniques as related to landscape ecology, hydrology, natural hazards, natural resources management, and environmental planning.

❖ FOE 124: Introduction to EIA

- **Introduction to EIA:5 credits (75 hours); L, T, P, SPW**

Objective: To introduce the students to EIA, the methodologies and approaches that can be used for impact assessment and to drill students on project management and working in a team

Content: Goals, principles, purpose, functions of EIA. EIA in development planning, EIA process and role of EIA in project development. Legal and administrative frameworks, EIA procedural flow, Cameroon EIA System, Environment Compliance Certificate (ECC), public participation in EIA.

❖ FOE 125: Environmental Research Methods

- **Environmental Research Methods: 4 credits (60 hours); L, T, P, SPW**

Objectives and Content: This course introduces students to basic research methods and internship reporting. It includes; sampling techniques and procedure, various techniques statistical analysis of data including some software programs. It also looks

at guides to report research, internship and experiments. Finally it trains students on proposal writing.

❖ FOE 126: Short Internship Report

- **Short Internship Report: 5 credits (75 hours); L, T, P, SPW**

Objective: To enable the student to: be acquainted with the industrial milieu, acquire more knowledge experience in a different environment
Content: Industrial integration. The student is followed up during this period both by a senior instructor in the industry and an academic supervisor.

❖ FOE 127: Computer Programming

- **Computer Programming: 3 credits (45 hours); L, T, P, SPW**

Generalities on Programming ,Delphi and Visual Basic Programming: Visual Basic concepts, Designing programs, Program Flow, Testing and Debugging, Functions, Arrays, Interacting with the user, Interacting with the system; Mastering of professional Software; Algorithms

❖ FOE 231: Engineering Mathematics III

- **Engineering Mathematics III: 4 credits (60 hours); L, T, P, SPW**

1. matrix theory, differential calculus
2. first order differential equations
3. linear differential equations of higher order
4. Laplace transformation, integral calculus, vector calculus
5. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
6. special functions(bassel function, splines and Legendre)
7. statistical and numerical methods, statistics and probability
8. numerical analysis, series and sequences, linear programming

❖ FOE 232: Statistics and Probability

- **Statistics and Probability: 5 credits (75 hours); L, T, P, SPW**

Introduction to probability; Random variables and functions of random variables; Mathematical expectations and moments; Special discrete and continuous distribution: binomial, exponential, gamma, chi-square, t- and F- sums of random variables, Law of large numbers; Central limit theorem

❖ FOE 233: Dendrology & Timber Harvesting

- **Dendrology & Timber Harvesting: 4 credits (60 hours); L, T, P, SPW**

Objective: To deepen a student's knowledge in dendrology and timber harvesting techniques

Contents: Identification, ranges, uses, and some ecological characteristics of evergreen and deciduous woody plants, both native and cultivated; lab and field work. Expert presentations, writing a report of a topical question of wood harvesting.

❖ FOE 234: Forest Insects & Diseases, Forest Biometrics

- **Forest Insects & Diseases, Forest Biometrics: 5 credits (75 hours); L, T, P, SPW**

Forest Insects & Diseases

Objective & Content: Information on the identification, biology, spread and control of bacteria and viruses causing plant diseases. Roles of insects in the functioning of healthy forest ecosystems, tactics for addressing challenges they pose to sustainable natural resource management, and emerging issues such as biological invasions, habitat alteration, and climate change that influence interactions among insects, their microbial associates, forests, and humans. Fundamental disease concepts, pathogens and causal agents, diagnosis, and biologically rational strategies and practices for management of diseases of woody landscape plants.

Forest Biometrics

Objective & Content: Basic concepts of statistical inference and sampling theory as applied to forestry. Estimation of tree and forest characteristics. Use of aerial photographs; principles of data processing; information gathering and decision making under uncertainty.

❖ FOE 235: Forest Soil Science

- **Forest Soil Science: 5 credits (75 hours); L, T, P, SPW**

Objective: The objective of the course is to provide the student with the necessary background in soil formation processes and properties to understand how soil horizons and profiles are formed and used to classify soils.

Contents: The course covers soil formation factors, processes and properties, diagnostic soil properties and horizons, and the principles of pedogenic soil classification. Main emphasis is on the FAO-UNESCO world soil classification system, but the US Soil Taxonomy and World Reference Base for Soil Resources systems are also introduced.

❖ FOE 236: Forest Ecology & Silviculture

- **Forest Ecology: 2 credits (30 hours); L, T, P, SPW**

Objective Content: The student will test and demonstrate principles and theories presented in the lectures. The student will also get acquainted with the newest measurement technology and the problems associated with field experiments. Introduction to major abiotic and biotic factors that influence forest ecosystem composition, structure, and function. Reviews important processes that influence structure and function of forest ecosystems. Field training and experience; exposure to forestry operations, equipment, procedures, and management problems. Uses basic ecosystem concepts to elucidate influence of anthropogenic (including forest management) and natural disturbances on forest ecosystem structure and function. Field studies of with uses of ecosystem models.

- **Silviculture : 2 credits (30 hours); L, T, P, SPW**

Objective Contents: The student will become acquainted with the basic principles of tropical production and land use systems as well as the major international agreements and policy processes relevant to tropical forests, forestry and land use. An introduction to tropical crop, livestock and forestry production systems and an overview of international environmental agreements, Ecologically-based forest management principles for sustainable timber production, maintenance or restoration of biological diversity, and maintenance of aesthetic quality and site productivity

❖ FOE 237: Civic education and ethics/ Law

- **Civic education and ethics: 3 credits (45 hours); L, T, SPW**
    1. Definition of:
        - Ethics
        - Civics
        - Deontology
        - Human rights
    2. Foundation of ethics
    3. General and Professional ethics
    4. Deontology in education
    5. Moral consciousness
    6. Universal declaration of Human Rights
    7. Protection of the environment
    8. 8. Profession / Vocation
    9. Good governance in public services
    10. Human qualities

- **Environmental Law**
- **Labour Law**

❖ FOE 241: Engineering Mathematics IV

- **Engineering Mathematics IV: 4 credits (60 hours); L, T, P, SPW**

1. Matrix theory, differential calculus
2. First order differential equations
3. linear differential equations of higher order
4. Laplace transformation, integral calculus, vector calculus
5. Fourier series and transformations, Z-transform, partialdifferential equation, complex variables and mapping,
6. Special functions(bassel function, splines and Legendre)
7. Statistical and numerical methods, statistics and probability
8. Numerical analysis, series and sequences, linear programming

❖ FOE 242: Cameroon Forest and Wild Life Law, Natural Resource Policy

- **Cameroon Forest and Wild Life Law**

Objective Content: To enable students get in depth and skills on the application of forest regulation in Cameroon. It shall examine the all knowledge forest& wildlife legislation in Cameroon including international treaties that Cameroon is signatory to.

- **Natural Resource Policy**

Objective and Content: This course will focus on two major aspects of natural-resource management: biodiversity protection and public lands such as national parks and wilderness areas both nationally and internationally. Class sessions will include critical examinations of current law and policy and in-depth discussions of situational case studies that force you to consider how you would resolve real-life issues. Historical and philosophical basis for and principal laws relating to forest, wildlife and related resources; roles of science and values in natural resources policy making; the policy process; the main federal and state renewable resource management agencies; ethics and professionalism.

❖ FOE 243: Field Techniques in Ecology & Natural Resources

- **Field Techniques in Ecology & Natural Resources: 4 credits (60 hours); L, T, P, SPW**

Objectives & Content: Applications of quantitative methods, including optimization and simulation, to the management of natural resources, especially forests.

❖ FOE 244: Forest Resources, Management & Conservation Techniques

- **Forest Resources, Management & Conservation Techniques: 4 credits (60 hours); L, T, P, SPW**

Objective: Students are familiarised with participatory methods and their applications in sustainable management of forests and other natural resources in developing and developed countries.

Contents: Lectures on participation, participatory methods and approaches, stakeholder analysis, community-based management of natural resources, conflicts and conflict management. Examples and case studies of developed and developing countries are also presented. Group works on selected tasks.

❖ FOE 245: Case Study

- **Case Study: 4 credits (60 hours); L, T, P, SPW**

Objective: Study visits to model projects and proposed projects. Preparation and submission of environmental impact assessment statement

❖ FOE 246: Internship

- **Internship: 6 credits (90 hours); P, SPW**

Objective: This course is to provide an opportunity for students to undertake an in-depth research investigation in one of the areas covered by the Programme and Specialization.
Content: Final year students will carry out project work. The project should belong to one or more of the following areas: computing and analysis; design; laboratory investigation; field testing and instrumentation; case studies. The project duration is over the entire second semester. An individual formal report is required. Each student is required to make an oral presentation.

❖ FOE 247: Engineering management

- **Engineering management: 3 credits (45 hours); L, T, SPW**

1. Forecasting, planning, control, organization, coordination, motivation and communication
2. Leadership, problem solving techniques, human relation
3. productivity, work flow, cost optimization, flow graphs
4. Work study, work measurement techniques, incentives, wages, quality control, site meetings and organizational structure
5. Use of planning tools (PERT, GANTT) with applications

The Minister of Higher Education

Pr Jacques FAME NDONGO

Field : WATER ENGINEERING AND MANAGEMENT

Specialty :

HYDROLOGY AND WATER RESOURCES MANAGEMENT

Field: WATER ENGINEERING AND MANAGEMENT

Specialty: Hydrology and Water Resources Management

1. Objective of the training

The main objective of hydrological education is to develop competence for the measuring, handling and analysis of hydrological data, as well as proficiency in the application of such information for the planning and design of water resources projects.

2. Skills sought after

→ **Generic Skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.
- Advance Level Geology
- Advance Level Geography

→ **Specific Skills**

- Improve the sustainable management of human impacts on water resources;
- Design simulation models for various phases of the water cycle;
- Contribute to the development of integrated solutions for reducing the impact of water related
- Natural hazards and other water issues;
- Acquire broad and in-depth knowledge of water-related scientific and engineering fundamentals;
- Transform their theoretical knowledge into quantitative approaches for the balancing of systems and to solve them analytically and numerically;
- Describe relevant circumstances in the environment, and represent specialized solutions to both experts;

- Acquire the ability to apply methods on their own in specific contexts;
- Have sound knowledge of the analysis of time- and space- related data, the design of experiments;
- Familiarise with the standard methods of data gathering and analysis and of hydrological design;
- Understand of the whole cycle and any one phase or part of the hydrological cycle.

6. Career opportunities

- Hydrologist-Responsible position in planning offices and engineering companies, industrial enterprises, public authorities; International development cooperation;

7. Organization of teachings

- **FIRST SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrology and Water Resources Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYW111	Mathematics I	30	15	10	5	60	4
HYW 112	Physics I	40	10	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
HYW 113	Hydrological cycle and water balance	30	15	10	5	60	4
HYW 114	The watershed and his characteristics	40	20	10	5	75	5
HYW 115	Hydro-meteorology	40	20	10	5	75	5
HYW 116	Infiltration and drainage	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYW 117	Bilingual training	30	5	5	5	45	3
Total		**240**	**100**	**75**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrology and Water Resources Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYW 121	Statistics	40	20	10	5	75	5
HYW 122	Project Management	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYW 123	Water quality and Pollution	30	15	10	5	60	4
HYW 124	Integrated Water resource management	30	15	10	5	60	4
HYW 125	Water quality and pollution	40	20	10	5	75	5
HYW 126	Initiation to GIS	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYW 127	Initiation to water Governance / Civic education and Ethics	30	10	0	5	45	3
Total		**240**	**115**	**60**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrology and Water Resources Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYW 231	Mathematics II	40	15	15	5	75	5
HYW 232	Physics II	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYW 233	Engineering Hydrology	40	20	10	5	75	5
HYW 234	General hydrogeology	30	15	10	5	60	4
HYW 235	Open Channel Hydraulics	40	20	10	5	75	5
HYW 236	Soil & Water Conservation	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYW 237	Economy and Business management	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrology and Water Resources Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYW 241	Hydro Statistics	30	15	10	5	60	4
HYW 242	Introduction to Urban hydrology	40	15	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
HYW 243	Hydrological measurement/ Introduce Lab exercises and field visits	40	15	15	5	75	5
HYW 244	Drainage Engineering	30	15	10	5	60	4
HYW 245	Data base organization and control	22	10	10	3	45	3
HYW246	Professional Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYW247	Computer Programing and Applications	30	5	5	5	45	3
Total		**202**	**75**	**125**	**58**	**450**	**30**

8. Courses content

❖ HYW 111 : Mathematics I

- **Mathematics I: 5 credits (75 hours); L, T, P, SPW**

Objectives

At the end of this course, student will be able to apply mathematics understanding to water engineering

4. **Importance of mathematics to students**
5. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
6. **Use of measures in hydrology (Basic Geometry (surface area, volumes, metric systems and concersions within µg,mg,g, kg, t, m,mm,cm,km2**
   - Linear measures
   - Square measure (area)
   - Cubic measure (volume)
   - Square roots
7. **Weights measurement and their use**
8. **Trigonometric calculations**
9. **Measurement conversions**
10. **Significant figures statistics**

❖ HYW 112: Physics I

- **Physics I: 4 credits (60 hours); L, T, P, SPW**

SI-units. Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young- interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle, continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

❖ HYW 113: Hydrological cycle and water balance

- **Hydrological cycle and water balance : 4 credits (60 hours); L, T, P, SPW**

Objectives:

- Describe the water cycle and its driving processes
- Measure important components of the water cycle, especially flow measurements in streams
- Describe how components of the water cycle are influenced by human activity
- Understand the water-balance equation and apply it to various hydrological problems in time and space

Course Content: The course covers the basic processes of the water cycle such as precipitation, evaporation, transpiration, the presence of soil water and groundwater, and runoff. Processes at the catchment scale, including the presence of recharge and discharge areas, the influence of topography on runoff formation, and flooding. Influence of forestry, agriculture, cities and dams on runoff and the water cycle. Water balance calculations for river basins.

❖ HYW 114: The watershed and his characteristic

- **The watershed and his characteristic: 4 credits (60 hours); L, T, P, SPW**

1. Classification of watershed by size and use
2. Hydrological behavior
3. Physical characteristics and their influences on the water flow.
4. Digital information and numerical models
5. Channel characteristics of watershed

❖ HYW 115:Hydro-meteorology

- **Hydro-meteorology : 5 credits (75 hours); L, T, P, SPW**

Objectives: Understand the relationships between meteorology and hydrology; the water cycle ; the meteorological elements; the various forms of precipitations; Understand the measurement of precipitation; Understand the precipitation analysis and integrated hydro-meteorological system ; Understand the meteorological and hydrological forecasting

1. Principles of meteorology : rainfall, the water cycle , cloud, Mechanisms of generation of the rainfall, Type and various form of precipitation, rainfall pattern, the meteorological elements
2. Relationship between meteorology and hydrology
3. The precipitation analysis and integrated hydro-meteorological system

4. Measurements of rainfall : Measures of the height of flood water, Observation Network and data publication
5. Regional evaluation of the precipitation
6. Evaporation and interception, evapotranspiration
7. Fundamentals of weather forecasting
8. Atmospheric pressure, the wind, the Temperature and air humidity

❖ HYW 116: Infiltration and drainage

➢ **Infiltration and drainage: 4 credits (60 hours); L, T, P, SPW**

1. Introduction: Definitions and descriptive parameters of infiltration, Factor influencing infiltration, Variation of the rate of infiltration
2. Introduction to drainage
3. Surface drainage, subsurface drainage, underground drainage
4. Measurement of drainage
5. Annual balance of drainage
6. Introduction to solid transport
7. Storage and variation of surface waters: The stocks of surface waters, underground stockage of water
8. Saturated and unsaturated zones

❖ HYW 117: Bilingual Training

➢ **English : 1.5 credits (22 hours 30mn)); L, T, SPW**

6. **Vocabulary**
   - Technical and usual vocabulary of the specialty
7. **Grammar**
8. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
9. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
10. **Write clear, detailed texts**
    - Essay writing;
    - Application for employment;
    - C.V;
    - Letter of motivation;
    - Letter/memo writing and minutes of a meeting

- **French : 1.5 credits (22 hours 30mn)); L, T, SPW**

4. **Vocabulaire**
   - Vocabulaire technique usuel
5. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
6. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ HYW 121: Statistics

- **Statistics : 5 credits (75 hours); L, T, P, SPW**

Objective:

Students will learn relevant statistical tools and techniques to collect analyse and present data

Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Why study statistics

- Uses of statistics
- Elements of statistics

2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography
   - Measures of location
   - Measures of variability
   - Interpreting the standard deviation
   - Other numerical measures
5. **Simple linear regression and correlation**
   - Introduction
   - Some definition
   - Scatter diagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ HYW 122: Project Management

➢ **Management of Projects: 4 credits (60 hours); L, T, P, SPW**

1. Technical aspects to project management
2. The construction project life cycle
3. Managerial aspects of project management
4. Project organization

❖ HYW 123: Water Pollution and hydrobiology

➢ **Water Pollution and hydrobiology: 5 credits (75 hours); L, T, P, SPW**

1. Fundamentals of Aquatic Chemistry: Importance of water for humans, Water withdrawal, Important properties of water, Anomalies of water, Molecule of water, Hydrogen bonds, Aquatic life, Main aquatic chemical processes

2. Chemical composition of natural waters Dissolved gases Metals in water Biogenic elements Cycle of biogenic elements in hydrosphere Types of natural waters Surface water from precipitations
3. Water pollutions and wastewater: Sources of water pollution Waste water Content and properties of waste water Chemical pollutant limitations Wastewater treatment
4. Aquatic ecosystems: abiotic and biotic components, habitats and ecological niche, biogeochemical cycles, relationships between abiotic and biotic components of aquatic ecosystems.
5. Introduction to aquatic bacteria and fungi, general characteristics and classification of freshwater bacteria and fungi; type study of a bacteria (Aeromonas) and a fungi (Saprolegina), isolation and culture techniques, economic importance of bacteria and fungi and their role in fresh water ecosystems - Microbiology of water supply; Microbial flora of surface and ground waters; Water treatment, water supply and public health, Microbial aspect of water management

❖ HYW124: Integrated Water resource management

- **Integrated Water resource management : 4 credits (60 hours); L, T, P, SPW**

Distribution of water on planet Earth, Hydrologic cycle, Renewable water resources, Time and space variability, Initial data and methodological approaches Continents, Natural-economic regions and countries, River basins, Inflow to the world Oceans. River runoff and underground water. Use of water resources, Principal water users and tendencies of their development, Assessing and forecasting global water use. Water availability and water resources deficit, Historical perspective of water and development, Anthropogenic changes in global climate and water resources. Ways of eliminating fresh water deficit in the world.

- Measurement of economic values of water
- Water Governance and Law

❖ HYW 125: Water Analysis and Water quality

- **Water analysis and Water quality: 5 credits (75 hours); L, T, P, SPW**

1. Individual indexes for determination of chemical content of water: pH and pOH dissolved oxygen Hydrogen sulfide and sulfides Acidity and alkalinity Components of carbonate system Chlorides and sulphates Hardness of water Potassium and sodium Calcium and magnesium Ammonia and ammonia salts Nitrates and nitrites Phosphates and polyphosphates Sillicium Iron Microelements (Mn, Cu, Zn, Co, Mo)

2. Composition of rainwater, Surface water and groundwater, introduction to physico-chemical properties of water; Weathering and water chemistry, Quality of water, Water quality standards, Causes and concepts of pollution of water, Groundwater and, Inorganic chemicals and organic compounds in water, Urban and highway diffuse pollution, Industrial water pollution, Agricultural diffuse pollution, Water quality and health, Water quality monitoring as an information system: Sample collection, laboratory analysis, data handling, data analysis, reporting, and information utilization, Total coliform test in drinking water by multiple fermentation tube method.

.

❖ HYW 126: Initiation to GIS

- **Initiation to GIS : 5 credits (75 hours); L, T, P, SPW**

Introduction to remote sensing, Principles of remote sensing, Remote sensing systems, Digital image processing, Concepts of GIS, Spatial data: sources, acquisition and entry, Database, Vector and raster data, Data analysis, GIS output, Integration of remote sensing and GIS, Application of remote sensing and GIS in water resources modeling and management

❖ HYW 127: Initiation to water Governance / Civic Education and Ethics

- **Initiation to water Governance : 2 credits (30 hours); L, T, SPW**

1. **Water policy and governance:**
   - Policy actors and instruments;
   - Policy evaluation tools;
   - Water institutions and governance;
2. **Water laws and institutions:**
   - The principles of Cameroonian's water laws;
   - Cameroonian's water institutions and legislations;
   - The translation of the water law into policies

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;

- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ HYW 231: Mathematics II

- **Mathematics II: 5 credits (75 hours); L, T, P, SPW**

Finite differences: Difference tables, forward, backward and central differences; Linear systems: Matrix methods, Gaussian elimination. Gauss-Seidel, ill–conditioning; Errors: Sources, estimates, propagation, floating point arithmetic; Operators; Curve fitting; Interpolation: Lagrange, Newton's forward and backward; Euler and Runge-Kuta methods; Collation polynomials; Newton-Raphson.

❖ HYW 232: Physics II

- **Physics II: 4 credits(60 hours); L, T, P, SPW**

❖ HYW 233: Engineering Hydrology

- **Engineering Hydrology : 4credits(60 hours); L, T, P, SPW**

Objectives

- Explain key hydrological processes that are important from an engineering perspective
- Explain how rainfall, streamflow and evapotranspiration data are measured and presented
- Explain how floods are statistically defined and estimate design flood magnitude based on a frequency analysis of historical data
- Derive and apply design rainfalls for engineering purposes
- Explain loss models that are used to determine runoff from rainfall and to calculate peak runoff discharges by the Rational Method
- Predict discharge hydrographs from catchments and the routing of flood hydrographs along stream channels and within reservoirs

Content

1. Hydrological processes and data measurement - The hydrologic cycle - Rainfall, evaporation and infiltration measurement - Streamflow measurement

2. Floods and Flood Frequency analysis - Runoff generation - Statistical tools for hydrological analysis - Flood Frequency curves
3. Estimating peak discharge - Rational method
4. Design flow hydrographs - Hydrograph components
5. Using Flood hydrographs - Catchment routing - Reservoir routing
6. Rainfall runoff monitoring - Loss models - Rainfall-runoff models -

Practical:

1. Demonstration of weather recording instruments and practice in taking actual data from weather stations including a visit to weather station.
2. Measuring runoff in the field by different techniques.
3. Development of unit hydrograph and its use.
4. Frequency analysis of rainfall data.
5. Measuring infiltration rate in the field.

❖ HYW 234: Introduction to Urban hydrology

- **Introduction to Urban hydrology : 5 credits (75 hours); L, T, P, SPW**

Objectives

The course will investigate the science and management of water in cities and built environments. Integrating hydrology, geology, biology, architecture/engineering students should be able to:

- Understand the natural and human factors that regulate hydrologic processes in urban areas
- Evaluate watershed land use changes and associated hydrologic impacts
- Analyze urban storm water systems
- Analyze urban precipitation and storm water runoff
- Describe methods to mitigate the effects of urbanization on aquatic systems

Course Content

1. Introduction to Hydrologic Science-Hydrologic cycle and global water distribution
2. Watershed concept and characteristics
3. Stream characteristics
4. Runoff processes and flow measurement-Introduction to Urban Areas and Land Use Change
5. Introduction to Urban Water Management,
6. Effects of urbanization on aquatic systems,
7. Open channel flow in urban watersheds,
8. Estimation of runoff rates from urban watersheds,
9. Storm water management,
10. Introduction to urban groundwater systems.

❖ HYW 235: Open Channel Hydraulics

- **Open Channel Hydraulics : 5 credits (75 hours); L, T, P, SPW**

Objective:

To study the basic concepts of fluid flow, principles of energy and momentum, and characteristics of different hydraulic structures used in open channel.

Contents:

1. **Basic Concepts of Fluid Flow**
   - Types, state and regimes of flow, channel flow types, channel geometry, measurement of velocity in channel, velocity distribution in channel and its coefficients, pressure distribution in channel, effect of slope on pre4ssure distribution.
2. **Energy and Momentum Principle:**
   - Basic equations, specific energy, specific energy and alternate depths, criteria for a critical state of flow, computation of critical flow, control of flow, application of flow control in rectangular channel, momentum in open channel flow, specific momentum, and hydraulic jump.
3. **Uniform Flow:**
   - Establishment of uniform flow. The Chezy's and Manning's equations, resistance coefficient estimation, normal depth and velocity, normal and critical slopes, free board, best hydraulic section, determination of section dimensions.
4. **Rapidly Varied Flow:**
   - Characteristics of varied flow, sharp crested weir, aeration of the nappe crest shape and discharge over spillway, type and characteristics of the hydraulic jump, jump as energy dissipater, flow through sudden transitions.

Practical:

1. Determination of discharging in open channel through different methods.
2. Development of stage-discharge curve (Y-Q Relationship)
3. Development of hydraulic jump
4. Flow through/over different hydraulic structures
5. Determination of critical flow, critical depth, alternative depth
6. Determination of Chezy and Manning n for a rectangular prismatic channel
7. Plotting flow profile of an open channel

❖ HYW 236: Soil & Water Conservation

- **Soil & Water Conservation : 4 credits (60 hours); L, T, P, SPW**

Contents:

- **Water Erosion:** Erosion agents. Geologic and accelerated erosion. Damages caused by soil erosion. Water erosion and its types. Factors affecting water erosion. Sedimentation and pollution in relation to water erosion. Water erosion prediction equation. Erosion control practices.
- **Rainfall and Runoff:** Rainfall intensity and duration. Infiltration, Factors affecting runoff. Damages caused by floods. Water harvesting.
- **Vegetated Outlets:** Use of vegetated outlets and water courses in the control of erosion. Design of vegetated outlets. Water-way construction and maintenance.
- **Water Conservation:** Definition of drought, Effects of drought. Water stored in soil. Decreasing runoff. Reducing evaporation. Reducing deep percolation. Preventing losses from storage.

Practical:

- Measurements of soil loss from splash erosion by rainfall simulator.
- Measurements of soil loss using universal soil loss equation.
- Demonstration of moisture conservation techniques.
- Field visit to areas with water and wind erosion prevailing.

❖ HYW 237: Economics and Business Management

- **Economy and management of enterprises: 3 credits (45 hours); L, T, P, SPW**

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

❖ HYW 241: Hydro Statistics

- **Hydro Statistics: 4 credits (60 hours); L, T, P, SPW**

Objectives: Understanding the nature of hydro statistical data, their types and uses, the procedures for collecting and summarizing hydro statistical data; the methods of hydro-data compilation and presentation; the methods of estimating missing data in hydrological data analysis; the methods of predicting the occurrences of hydrological hazards.

Content

1. Introduction to Hydrostatistics
2. Procedure of collecting Hydrostatistical data
3. Methods of hydrological data compilation, summarisation and presentation
4. Probability theory and their applications in hydrology
5. Estimation of Missing Data in Hydrology and Water Resources
6. Estimation of Variability of Hydrologic Data
7. Methods of Predicting Hydrological Hazards

❖ HYW 242: Introduction to hydrogeology

- **Introduction to hydrogeology: 5 credits (75 hours); L, T, P, SPW**

1. Definition, types of aquifers and properties
2. Groundwater flow –Darcy Law
3. Groundwater Processes
4. Occurrences of ground water distribution and their uses.
5. Factors that affect water movement in soils.
6. Principles of groundwater investigation/exploration.
7. Principles of groundwater exploitation.
8. Chemical characteristics of groundwater.
9. Groundwater geochemistry
10. Hydrochemical sampling and analytical procedures
11. Groundwater contamination: major types , sources and transport. Possible remediation strategies

❖ HYW 243: Hydrological measurement/Introduce Lab exercises and field visits

- **Hydrological measurement/Introduce Lab exercices and field visits : 5 credits (75 hours); L, T, P, SPW**

- **Hydrological field tools** : installation of hydro-meteorological equipment for measuring rainfall, temperature, water level and discharge, soil and aquifer permeability measurements, soil moisture and tension measurements, water

sampling and chemical analysis, datalogger programming, data processing and analyses.

- **Hydrometry**: Types, installation and maintenance of gauging stations; water level measurements and installation procedures; principles of discharge measurement; principles of discharge computation; basics of gauging station management; basic concepts of sediment discharge and water quality measurements.

- **Remote sensing measurements**: electromagnetic radiation and interactions with vegetation, soil, rock and water; remote sensing-derived environmental data from satellites to derive information on geology, soil, water, and vegetation, remote sensing techniques in hydrological analysis and modeling

➢ **Introduce lab exercises and field visits**

1. quantity and quality measurements
2. Hydrology lab exercises
3. infiltration exercises
4. Field visits at well and bore-hole construction sites
5. Field visit to a water treatment plant
6. Field visit to a water analysis laboratory

❖ HYW 244: Drainage Engineering

➢ **Drainage Engineering : 4 credits (60 hours); L, T, P, SPW**

Objective: Providing knowledge and skills required on drainage systems, types, requirements and design of drainage systems, operation & maintenance.

Contents:

- **Introduction:** Definition of agricultural drainage, drainage system terms, scope and benefits. Elements of drainage design, types of drainage problems, differences in drainage in humid and arid areas, Surface and Subsurface drainage principles, theories of open drain/ditch and subsurface drainage systems, design criteria.
- **Drainage Investigations:** Reconnaissance. Preliminary Survey. Design survey. Investigations for surface and subsurface drainage. Auger hole test, Piezometer test. Single well draw down test. Shallow well pump test. Ring permeameter test. Test pit method. Test for determining infiltration rate.
- **Drainage Requirements:** Plant processes. Raw materials, Plant structure, Factors controlling production. The soil environment and aeration requirement. Diagnosis and improvement of salt affected soils, Plant response to salinity, Soil response to excess water and salinity, Situation in which drainage problems exist.

- **Drainage System:** Investigation procedure, Moisture holding capacity in the root zone, annual irrigation schedule, deep percolation from irrigation, sources causing high water table conditions, determination of barrier zone and drain locations.
- **Surface Drainage:** Surface drainage system, type and functions of surface drainage ditches, land forming, joint surface and subsurface drainage system.
- **Sub-Surface Drainage:** Planning subsurface drainage system, Use of vertical drainage system. Design, installation, and construction of subsurface drains, Maintenance of buried drains. Open ditches for drainage. Interceptor and mole drains; Design and construction.
- **Operation and Maintenance of Drainage System:** Buried Pipe drainage system, open drainage system, drainage water disposal ponds, drainage observation well, policy and basic requirements, weed control and embankment stability.

Practical:

1. Verification of Darcy's Law by laboratory methods
2. Measurement of seepage losses.
3. Determination of water table,
4. Saturated hydraulic conductivity by piezometers,
5. Auger hole, planning of a subsurface drainage system and outlet with design of a sump;
6. Visit of Drainage Projects. Computation of leaching requirement and drainage coefficient of a drainage basin.

❖ HYW 245: Data base organization and control

- **Data base organization and control: 3 credits (45 hours); L, T, P, SPW**

1. Basic methods of data collection, processing, classification and archiving in hydrology.
2. Issues associated with Hydrologic data.
3. Techniques of organization and control of precipitation data, stream flow data, water quality data, and ground water data.
4. Errors in Hydrological Observations, Definitions of terms related to measurement errors
5. Validation of Hydrologic Data
6. Application of Geographic information Systems and Remote Sensing in Hydrologic data collection and processing.

❖ HYW 246: Professional internship

- **Professional Internship: 6 credits (90 hours); L, T, P, SPW**

7. Working in a company
8. Holding of the Intern journal

9. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
10. Elaboration of method of research
11. Resources to be exploited
12. Organization of work
13. Drafting of the report

❖ HYW 247: Computer Programming and Applications

- **Computer Programming and Applications : 3 credits (45 hours); L, T, P, SPW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

- Introduction: Computer components, operating system, software & applications
- Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

1. Demonstration of computer components and Windows installation.
2. Exercise on the use of word processing, spreadsheet and engineering graphics.
3. Programming of engineering problems with C++.

Field : WATER ENGINEERING AND MANAGEMENT

Specialty :

HYDROLOGY AND GROUND WATER MANAGEMENT

Field:	WATER ENGINEERING AND MANAGEMENT

Specialty:	Hydrogeology and Groundwater management

1. The objective of the training

This specialty aims to train specialists who work to detect groundwater for consumption, irrigation or geothermal energy. In addition, they are also responsible for monitoring the groundwater, so as to anticipate the impact on the drinking water supply, by assessing the consequences of drought periods, heavy rains or that of various types of pollution

2. Skills sought after

→ **Generic skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

→ **Specific skills**

- Identify and inventory aquifers and aquifers;
- Understand key principles and themes in water management and the relevance of groundwater;
- Appreciate the special characteristics of groundwater compared to surface water resources;
- Recognise challenges facing groundwater management and the need for new approaches to address the resource management problems.
- Emphasize key advantages of incorporating groundwater management into national and river-basin water resource planning

3. Career opportunities

- Council with decentralized local authorities, NGOs and development partners;
- Consultants in the groundwater abstraction field ;
- Water distribution companies;
- Research institutions.

4. Organization of teachings

- **FIRST SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrogeology and Groundwater management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYG111	Mathematics	40	20	10	5	75	5
HYG112	Physics	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYG113	General Geology	30	15	10	5	60	4
HYG114	Geotechnical engineering	30	15	10	5	60	4
HYG115	Introduction to hydrogeology	40	20	10	5	75	5
HYG116	Fluid mechanics	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYG117	Bilingual training	30	10	0	5	45	3
Total		**240**	**115**	**60**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrogeology and Groundwater management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYG121	Geophysics	40	15	15	5	75	5
HYG122	Geochemistry	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYG123	Water laboratory and analysis	40	20	10	5	75	5
HYG124	Water Well drilling and Pumps	30	15	10	5	60	4
HYG125	Introduction to Groundwater Exploration	40	20	10	5	75	5
HYG126	Aquifer Systems Characterization for Groundwater Management	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYG127	Initiation to water Governance / Civic Education and Ethics	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrogeology and Groundwater management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYG231	Statistics & Probability	40	15	15	5	75	5
HYG232	Initiation to GIS	35	10	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYG233	Soil mechanics	30	15	10	5	60	4
HYG234	Surveying and Leveling	30	15	10	5	60	4
HYG235	Hydrogeology II	40	20	10	5	75	5
HYG236	Hydrogeochemistry	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYG237	Economics and Business Management	30	10	0	5	45	3
Total		**245**	**105**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: **Water engineering and management**		Specialty: Hydrogeology and Groundwater management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYG241	Introduction to Hydro Data Processing	40	15	15	5	75	5
HYG242	Technical Drawing	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYG243	Groundwater Quality	35	10	10	5	60	4
HYG244	Integrated Groundwater Management in Practice/ Groundwater Quality Management	35	10	10	5	60	4
HYG245	Hydrogeological field methods	35	10	10	5	60	4
HYG246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYG247	Computer and Multimedia	30	10	0	5	45	3
Total		**205**	**75**	**110**	**60**	**450**	**30**

5. Courses content

❖ HYG 111: Mathematics I

- **Mathematics I: 5 credits (75 hours); L, T, P, SPW**

Objectives
At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

1. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
2. **Use of measures on the farm**
   - Linearmeasures
   - Square measure (area)
   - Cubic measure (volume)
   - Square roots
3. **Weights and their use**
4. **Trigonometric calculations**
5. **Measurement conversions**
6. **SI-units. Significant figures**

❖ HYG 112: physics I

- **Physics : 4 credits (60 hours); L, T, P, SPW**

Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young- interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle, continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's
laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

❖ HYG 113: General Geology

- **Geology : 4 credits (60 hours); L, T, P, SPW**

1. Study of rocks and minerals and the processes operating on Earth ;
2. Mineralogy and Petrology;
3. Structural geology
4. Introduction to principles of soil genesis, classification, physical and chemical properties;
5. Introduction to stratigraphic principles ;
6. Introduction to geophysical processes and geophysical field methods

❖ HYG 114: Geotechnical engineering

- **Introduction to Geotechnical engineering : 4 credits (60 hours); L, T, P, SPW**

1. Introduction: Origin of soils, formation of soils, clay mineralogy and soil structure Soil classification: Particle size distribution, use of particle size distribution curve, Particle size classification, textural classification, HRB classification, Unified classification system, Field identification of soils.
2. Soil moisture: Types of soil water, capillary tension, capillary siphoning.
3. Stress conditions in soil: Total stress, pore pressure and effective stress.
4. Permeability: Darcy's law, permeability, factors affecting permeability, determination of permeability (laboratory and field methods), and permeability of stratified soil deposits.
5. Estimation of yield from wells.
6. Seepage analysis: Seepage pressure, quick condition, Laplace equation for two –dimensional flow, flow net, properties and methods of construction of flow net, application of flow net, seepage through anisotropic soil and non-homogenous soil, seepage through earth dam.

❖ HYG 115: Introduction to hydrogeology

- **Introduction to hydrogeology: 5 credits (75 hours); L, T, P, SPW**

1. Introduction: Origin of soils, formation of soils, clay mineralogy and soil structure Soil classification: Particle size distribution, use of particle size distribution curve, Particle size classification, textural classification, HRB classification, Unified classification system, Field identification of soils.
2. Soil moisture: Types of soil water, capillary tension, capillary siphoning.
3. Stress conditions in soil: Total stress, pore pressure and effective stress.

4. Permeability: Darcy's law, permeability, factors affecting permeability, determination of permeability (laboratory and field methods), and permeability of stratified soil deposits.
5. Darcy's Law and groundwater flow
   - Hydraulic Conductivity
   - Estimation of Saturated Hydraulic Conductivity
   - Steady state redials flow through confined and unconfined aquifer
   - Transient groundwater flow
   - Recharge and discharge areas
   - Groundwater runoff (base flow)
6. Estimation of yield from wells.
7. Seepage analysis: Seepage pressure, quick condition, laplace equation for two –dimensional flow, flow net, properties and methods of construction of flow net, application of flow net, seepage through anisotropic soil and non-homogenous soil, seepage through earth dam.
8. Lab exercises

❖ HYG 116: Fluid mechanics

- **Fluid Mechanics : 5 credits (75 hours); L, T, P, SPW**

Objective: To study the fundamentals of fluid mechanics including statics and kinematic, concept of energy, momentum, forces and flow

- **Fundamentals of Fluid Mechanics:** Definition and branches of fluid mechanics, distinction between solid and fluids,
- Properties of fluids: density, viscosity, surface tension, specific weight, specific gravity, etc., bulk modules of elasticity, compressibility of fluids.
- **Fluid Statics:** Pressure variations in a fluid, pressure measuring devices, gauges and manometers, buoyancy and stability of submerged and floating bodies, forces on plane and curved surfaces, center of pressure.
- **Fluid Kinematics:** Types of flow, dimensions of flow, streamlines, path lines, flow patterns for different references, continuity equation, source flow, sink flow, flow nets, uses and limitations of flow net.
- **Energy Consideration in Steady Flow:** General equations of steady flow, heads, Bernoulli's equation and its practical applications, hydraulic and energy grade lines, power consideration in fluid flow, cavitations, head losses, solution of flow problems.
- **Momentum and Forces in Fluid Flow:** Impulse-momentum principle and application, force exerted on a stationary and moving bodies (flat and curved), relation between absolute and relative velocities, reaction of a jet, jet propulsion, torque in rotating machines.

- **Fluid Flow Measurements:** Orifices, weirs, notches and venture meter, pilot tube, coefficient of contraction, velocity and discharge, derivation of their discharge formulae and their applications.

❖ HYG 117: Bilingual training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;

- De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
- Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ HYG 121: Geophysics

➢ **Geophysics : 5 credits (75 hours); L, T, P, SPW**

1. Application of Geophysics to groundwater exploration
2. Data Acquisition Processing,
3. Global Seismology and Seismic Waves,
4. Earthquakes and Seismotectonics
5. Earthquake Cycle Deformation and Geodesy
6. Refraction Seismology
7. GPR Surveying
8. Electrical Resistivity Surveying
9. Electrical Resistivity Methods
10. Tectonophysics,
11. Seismic Reflection,
12. Ground-Penetrating Radar,

❖ HYG 122: Geochemistry

➢ **Geochemistry: 4 credits (60 hours); L, T, P, SPW**

❖ HYG 123: Water laboratory analysis

- **Water laboratory analysis:**

1. Sampling of surface water, groundwater and sea water
2. Field measurements of water parameters
3. Water treatment and conditioning: filtrations, vessels preparation and treatment, water samples conservation
4. Lab measurement of physic-chemical parameters
5. Analysis of chemical and geochemical characteristics
6. Measurement of physical properties
7. Potentiometric measurements
8. Analysis of heavy metallic parameters
9. Analysis of organic parameters

❖ HYG 124: Water Well Drilling and Pumps

- **Water Well Drilling and Pumps**

Well Industry Role; Basic Tools and Skills; Hydraulic and Air Operated Equipment ; Well Construction and Design; Drilling Systems; Well Development; Well Pumping Systems; Well Maintenance; Well Drilling Records and Specifications ; Metric in Water Well Drilling and Specifications; Ground Water Monitoring Groundwater balance, conjunctive use of water, legal aspect of groundwater management.

Well Hydraulics: aquifer, aquiclude, aquifuge and aquitard, unconfined aquifer, confined aquifers, perched aquifer, semi-confined aquifers, cone of depression, circle of influence, drawdown, Duipuit Thiem theory, and steady state flow to aquifers.

Water Wells: open/dug wells, tube wells, skimming and scavenger wells, strainer type tube wells, cavity type tube wells, slotted type tube wells, type of Strainers.

Construction of Open Wells: wells with impervious lining, wells with pervious lining, yield of an open well by constant level pumping test, yield of an open well by recuperation test.

Construction of Shallow and Deep Wells: bored wells, driven wells, jetted wells, cable tool method, hydraulic rotary method, reverse rotary method.

Pumps: components and classification, centrifugal, jet, positive displacement, turbine pumps, submersible pumps, propeller and mixed flow pumps and air lift pumps, types of impellers.

Terminology in Pumping Systems: specific speed, priming, pumping energy, total dynamic head, pump problems and their remedies.

Power Requirement of Pump: irrigation system head and power requirements, suction lift, well drawdown, friction head loss, operating head-seasonal-variation in system head curve, pump selection, prime mover electric, diesel and their selection, feasibility of prime mover selection

❖ HYG 125: Introduction to Groundwater Exploration

- **Introduction to Groundwater Exploration : 4 credits (60 hours); L, T, P, SPW**

1. Aerial methods: Photogeologic Methods; Landsat/ IRS; Infrared imagery; Electromagnetic.
2. Surface methods : Geological Methods; Geomorphological methods; Hydrogeological Methods; Geophysical Methods (Electrical & EM, Seismic, Magnetic, Gravity); Geobotanical Methods; Geochemical Methods;
3. Sub-Surface methods: Geological; Hydrogeological; Tracer techniques; Geophysical Logging techniques.
4. Esoteric : Water divining ; Astrological ; Biophysical.

❖ HYG 126: Aquifer Systems Characterization for Groundwater Management

- **Aquifer Systems Characterization for Groundwater Management: 4 credits (60 hours); L, T, P, SPW**

1. Types of aquifer systems
2. Groundwater occurrence
3. Characterization of groundwater flow systems
4. Groundwater balance and recharge
5. Groundwater and surface water interaction

❖ HYG 127: Initiation to water Governance / Civic Education and Ethics

- **Initiation to water Governance : 2 credits (30 hours); L, T, SPW**

3. **Water policy and governance:**
   - Policy actors and instruments;
   - Policy evaluation tools;
   - Water institutions and governance;
4. **Water laws and institutions:**
   - The principles of Cameroonian's water laws;
   - Cameroonian's water institutions and legislations;
   - The translation of the water law into policies

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;

- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ HYG 231: Statistics & Probability

➢ Statistics & Probability: 5 credits (75 hours); L, T, SPW

Objective:

Students will learn relevant statistical tools and techniques to collect analyse and present data

Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Introduction**
   - Definition
   - Why study statistics
   - Uses of statistics
   - Elements of statistics
2. **Sources and methods of data collection**
   - Introduction
   - Sources of data
   - Methods of data collection
   - Errors in data collection
3. **Methods for describing sets of data**
   - Introduction
   - Tables
   - Graphics methods of data presentation
4. **Data analysis**
   - Introduction
   - Ratios and percentages in demography

- Measures of location
- Measures of variability
- Interpreting the standard deviation
- Other numerical measures

5. **Simple linear regression and correlation**
   - Introduction
   - Some definition
   - Scatter diagram
   - Regression line
   - Correlation coefficient
6. **The normal distribution**

❖ HYG 232: Initiation to GIS

- **Initiation to GIS: 5 credits (75 hours); L, T, P, SPW**

Introduction to remote sensing, Principles of remote sensing, Remote sensing systems, Digital image processing, Concepts of GIS, Spatial data: sources, acquisition and entry, Database, Vector and raster data, Data analysis, GIS output, Integration of remote sensing and GIS, Application of remote sensing and GIS in water resources modeling and management

❖ HYG 233: Soil mechanics

- **Soil mechanics : 4 credits (60 hours); L, T, P, SPW**

Soil Formation: Soil and its Constituents, Weathering of Rocks and Types of Soils, Description and identification of soil (Visual-Manual Procedure), Mineralogy of Solids.

Physical Properties: Water Content, Void Ratio, Porosity, Degree of Saturation, Specific Gravity, Unit Weight and their determination, Atterberg limits, Sieve Analysis, Hydrometer and Pipette Analysis, Stoke's Law, Grain Size distribution

Classification of Soils: Grain Size Classification; Bureau of Soils, Classification systems. Textural Classification by Triangular Chart Unified Soil Classification.

Permeability and Seepage: Definition, Hydraulic Gradient, Darcy's Law, Factors affecting Permeability, Permeability of stratified soils, Laboratory and Field determination of coefficient of Permeability, Seepage Force, Quick Sand Condition, Flow nets, Boundary Conditions, Graphical Method of Flow net construction, Determination of Quantity of Seepage, Two Dimensional Flow, Laplace Equation, seepage through Earth Dams, Design of Filters

Compaction: Purpose and theory of Compaction, Moisture Content and Dry Density relationship, Standard Proctor Compaction Test, Modified Proctor compaction Test, Degree of Compaction and its determination in the Field. Methods of compaction in the field; Factors affecting compaction of soils.

Vertical Stresses in Soils:

Definition, Stresses caused by self-weight of soil, Geostatic stresses, stresses caused by Point Loads and uniformly distributed Loads: Boussinesq and Westergarrd theories,

Pressure bulb, Stress distribution diagram on horizontal and vertical, Stress at a point outside loaded area, Newmark's charts and 2:1 Method

Soil Exploration: Importance of Soil Exploration, Soil Exploration methods, Probing, Test Trenches and Pits, Auger boring, wash boring, rotary boring, Percussion drilling and Geophysical methods, Sol Samples, Disturbed and Un-disturbed samples, In-situ Tests (SPT, CPT and PLT)

Practical:

Identification of Soil (Visual and Manual)
Determination of Moisture Content of Soil
Determination of Specific Gravity of Soil
Determination of Liquid Limit of Soil
Grain Analysis of Soil (including both Mechanical and Hydrometer Analysis)
Determination of Plastic Limit and Plasticity Index of Soil
Determination of Shrinkage Limit of Soil
Classification of Soil
Modified/Proctor Compaction Test
Constant Head Permeability Test (Granular Soil)
Falling Head Permeability (Granular and Fine Grained Soils)

❖ HYG 234: Surveying and Leveling

- **Surveying and Leveling: 4 credits (60 hours); L, T, P, SPW**

Objective:

- To enable students to understand theory and practice of land surveying and leveling.
- To develop skills to use modern survey instruments for above objective.

Contents:

Introduction: Surveying instruments; Chains, Tapes, Steel Bands, their Types and Uses
Chain Surveying: Ranging and chaining of survey Lines. Fieldwork and plotting of chain survey.
Compass Surveying: Prismatic Compass and Surveyor Compass, Uses, Bearing, Local Attraction, Fieldwork and Plotting
Plane Table Surveying: Parts and Accessories, Methods of Surveying, Two Point and Three Point Problems
Leveling: General Principle, Types of Levels and their temporary and Permanent Adjustments, Methods of Leveling, Reduction of Level, Precise Leveling and Trignometric Leveling
Theodolite: Types and uses of Theodolites, Temporary and Permanent Adjustments, Measurement of Horizontal and Vertical angles
Tachometrical Surveying: Methods of Tachometric Surveying. Fieldwork and computations.
Traversing: Traversing with Prismatic Compass, Theodolite and Plane Table, Computations and Adjustments of Traverse, Transformation of Co-ordinates
Calculation Of Areas And Volumes: Earth work calculation, D.M.D method, Simpson rule and Trapezoidal rule

Practicals:
Practice on measurement of distances and introduction to measuring instruments
Chain Surveying and plotting
Compass Traversing
Plane Table by methods of radiations and intersections
Two Points Problem
Three Points Problem

❖ HYG 235: Hydrogeology II

- **Hydrogeology II: 5 credits (75 hours); L, T, P, SPW**

This is an introductory course in hydrogeology. It looks at groundwater within the hydrologic cycle. Basic aspects are considered of the occurrence of groundwater; different hydrogeological formations; abstraction using wells; groundwater flow concepts; groundwater exploration techniques; well hydraulics and aquifer tests from pumped wells. The course also includes exploration and testing methods for the purpose of finding and utilizing ground water resources. Finally it ends with the chemical quality and pollution aspects of groundwater.

1. **Groundwater and the Hydrologic Cycle**
   - Origin of Groundwater, The Hydrologic Cycle, Hydrologic Budget
2. **Hydrogeological Formations**
   - Crystalline basement rocks, consolidated sedimentary aquifers, unconsolidated sedimentary aquifers, volcanic terrains, springs
3. **Groundwater Flow**
   - Hydraulic gradient, groundwater velocity, Darcy's Law, flow nets, Flow net boundaries
4. **Groundwater Exploration**
   - Groundwater Surveys, the most widely used techniques, Geophysical well logging, Project Reports
5. **Well Hydraulics and Aquifer Tests**
   - Steady flow to Wells, transient flow to wells, pumping tests, slug tests
6. **Water Wells**

❖ HYG 236: Hydrogeochemistry

- **Hydrogeochemistry : 5 credits (75 hours); L, T, P, SPW**

Objectives : Determining the time and source of groundwater recharge, Stimating how long water has been in an aquifer, Identifying mineral make-up of aquifer materials, Examining how water from different sources mix and interact and Evaluating what types of (bio)geochemical processes have occurred during the water's journey through the system.

1. Geochemical characteristics of Groundwater
2. Principles of hydrogeochemistry

3. Carbonate system
4. Rock weathering and water geochemistry
5. Introduction to transport processes
6. Contamination by metals
7. Organic Contamination
8. Geochemical aspects of remediation of contaminated aquifers
9. Risk analysis and assessment

❖ HYG 237: Economics and Business Management

- **Economics and Business Management : 3 credits (45 hours); L, T, P, SPW**

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

❖ HYG 241: Introduction to Hydro Data Processing

- **Introduction to Hydro Data Processing: 4 credits (60 hours); L, T, P, SPW**

1. Basic methods of data collection, processing, classification and archiving in hydrogeology.
2. Issues associated with Hydrogeologic data.
3. Techniques of organization and control of precipitation data, stream flow data, water quality data, and groundwater data.
4. Errors in Hydrogeological Observations, Definitions of terms related to measurement errors
5. Validation of Hydrogeologic Data

6. Application of Geographic information Systems and Remote Sensing in Hydrogeologic data collection and processing.

❖ HYG 242: Geophysics II

- **Geophysics II: 4 credits (75 hours); L, T, P, SPW**

1. Potential field methods, gravimetric and magnetic methods
2. Seismic methods
3. Electrical and electromagnetic methods
4. Geophysical survey
5. Groundwater exploration and groundwater protection.
6. Physical rock parameters measured by geophysical methods and hydrological parameters
7. Hydrogeological parameter
8. Influence of hydrological parameters on geophysical measurements

❖ HYG 243: Groundwater Quality

- **Groundwater Quality : 4 credits (75 hours) L, T, P, SPW**

1. Principles of Aqueous Geochemistry: Reactions - Chemical Activity – Thermodynamics; pH, Acids/Bases ; Equilibrium Equation Calculations ; Ion Complexes ; Mineral Dissolution-Precipitation reactions
2. Chemical Processes in groundwater: Adsorption (Isotherms , Ion Exchange , Surface Complexation Reactions); Oxidation-Reduction (Redox) Reactions (pe-Eh , Redox Reaction Chemistry, Organic Compound Decomposition, Electron Donors and Acceptors , Metals , Redox Chemistry)
3. Metals Geochemistry : Soil-Water-Gas Interactions (unsaturated zone) , Mineral-water, equilibrium reactions for metals in the saturated zone , Ground-Water Quality Conditions, Background Metals Concentrations: Pb, As, Cr, Cd, Mg

❖ HYG 244: Integrated Groundwater Management in Practice/ Groundwater Quality Management

- **Integrated Groundwater Management in Practice/ Groundwater Quality Management: 4 credits (75 hours) L, T, P, SPW**

1. **Integrated Groundwater Management in Practice**
   - Groundwater in the hydrologic cycle
   - Sustainable groundwater use
   - Water resource use and human interaction.
   - Demand management and efficiency use

- Groundwater management for river basins
- groundwaterWater resources assessment
- Social change instruments and conflict resolution
- Regulatory instruments, allocation and water use limits
- Economic instruments, efficiency and equally use value and prices
- Information management and exchange

2. **Groundwater Quality Management**
   - Water quality and pollution
   - Types and Sources of pollution
   - Groundwater pollution sources, pollution control remediation, transport processes in groundwater
   - Water quality modeling
   - Environmental guidelines for water quality
   - Watershed Management & GW Quality
   - Groundwater Problems

❖ HYG 245: Hydrogeological field methods

➢ **Hydrogeological field methods: 4 credits (60 hours); L, T, P, SPW**

1. **In the classroom:**
   - Theoretical background of the methods applied in the field and in the laboratory (see above)
2. **In the field:**
   - Soil Sampling / Drilling
   - Surveying / Levelling
   - Piezometric Heads / Potentiometric Surfaces
   - Pumping Test - Recovery Test
   - Piezometer test / Slug test
   - Tracer Test
   - Geophysical Borehole measurements / Natural groundwater velocity
   - Groundwater Chemistry
   - Hydrogeological Site Assessment
3. **In the lab:**
   - Column Experiments to Determine the Hydrodynamic Dispersion Coefficient and the Hydraulic Conductivity
   - Particle-Size Distribution and Soil Characterization
   - Rocks: Definitions, Characterization, Classification, Genesis, Hydraulic Properties

❖ HYG 246: Professional internship

➢ **Professional internship: 6 credits (90 hours); L, T, P, SPW**

1. Arrival and Business Integration
2. Working in a company

3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of the canvas of research
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ HYG 247: Computer and Multimedia

- **Computer and Multimedia: 3 credits (45 hours); L, T, P, SPW**

Field : WATER ENGINEERING AND MANAGEMENT

Specialty :

WASTE WATER MANAGEMENT

Field:	WATER ENGINEERING AND MANAGEMENT

Specialty:	Waste Water Management

1. Objective of the training

- To produce competent professionals with key skills adequate to solve practical problems relating to wastewater management,
- To enhance students' knowledge and practical skills with respect to Wastewater Management technology (WWM).
- To increase knowledge through conduct of basic, and adaptive research.

2. Skills sought after

→ **Generic Skills**

- Master basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

→ **Specific Skills**

- Adequate to solve practical problems relating to waste and water management,
- Knowledge and practical skills with respect to Waste and Water Management technology (WWM);
- Acquire techniques on the treatment of waste by incineration and the thermal treatment;
- Analyze land filling system as a waste treatment method to the students;
- Diagnose and identify practical bottleneck;
- Potential processing and storage contaminants;

3. Career opportunities

The training, graduates can aspire for the following responsibilities and job opportunities in both the Public and Private Sector businesses, and Not-for-Profit organizations:

- Waste management officers (engineers and technicians):
- Waste Water management technicians and engineers

,

4. Organization of teachings

- **FIRST SEMESTER**

Field: **Water engineering and management**		Specialty: **Waste Water Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WWM111	Engineering Mathematics	30	20	5	5	60	4
WWM112	Environmental microbiology	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
WWM113	Quality Characteristics of Wastewater	30	15	10	5	60	4
WWM114	Sustainability, Population and Sustainable development practices / Environmental Engineering System	45	20	5	5	75	5
WWM115	Sources and type of wastewater	45	15	10	5	75	5
WWM116	Surface Hydrology	30	20	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WWM117	Bilingual Training	30	10	-	5	45	3
Total		**255**	**115**	**45**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: **Water engineering and management**		Specialty: **Waste Water Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WWM121	Technical Statistical Methods	30	25		5	60	4
WWM122	Introduction to Fluid Mechanics/ Hydraulics	30	15	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
WWM123	Surveying and Leveling/ GIS and Remote sensing	30	15	10	5	60	4
WWM124	Industrial wastewater pollution, prevention and control	30	15	25	5	75	5
WWM125	Collection and Transport of Wastewater	25	10	15	10	60	4
WWM126	Short Internship Report	45	25		5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WWM127	Communication Skills /Computer Programming	30	10		5	45	3
Total		**210**	**100**	**80**	**60**	**450**	**30**

THIRD SEMESTER

Field: **Water engineering and management**		Specialty: **Waste Water Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WWM231	Fundamentals of Industrial chemistry	30	15	10	5	60	4
WWM232	Computer for Business	45	25		5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
WWM233	Basic Wastewater Treatment Processes	30	15	10	5	60	4
WWM234	Waste water Quality Assessment Techniques	45	25		5	75	5
WWM235	Integrated Water Resource Management	45	25		5	75	5
WWM236	Water Pollution Control	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WWM237	Civics and Ethicals Education	30	10		5	45	3
Total		**265**	**125**	**35**	**45**	**450**	**30**

- **FOURTH SEMESTER**

Field: **Water engineering and management**		Specialty: **Waste Water Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
WWM241	Wastewater Regulation	40	20	10	5	75	5
WWM242	Design of Wastewater Treatment Systems	30	25	-	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
WWM243	Environmental processes monitoring/Biotechnology in waste management	20	15	20	5	60	4
WWM244	Waste water treatment and Reuse processes	30	10	-	5	45	3
WWM245	Chemical analysis for environmental /microbiology laboratory	45	25	-	5	75	5
WWM246	Internship	-	-	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
WWM247	Environmental Policy and Ethics	30	10	-	5	45	3
Total		**195**	**95**	**90**	**60**	**450**	**30**

5. Courses content

❖ WWM 111 : Engineering Mathematics

- **Engineering Mathematics : 4 credits (60 hours); L, T, P, SPW**

1. Linear equation, differentiation, integration, geometric equations
2. Differentiation Rolle's Theorem and the man value theorems, repeated differentiation, and application for differentiation indeterminate form; vector algebra and its application
3. Laplace Fourier partial differentiation equations, arbitrary constants and arbitrary.

❖ WWM 112: Environmental microbiology

- **Environmental microbiology: 5 credits (75 hours); L, T, P, SPW**

1. The foundational concepts in microbiology in environmental systems.
2. Function and formation of cellular components starting from basic molecules (carbohydrates, fatty acids, amino acids, and nucleotides) to the cellular structures that are formed (membranes, proteins, and the nucleic acids RNA
3. & DNA);
4. Carbon, energy, and nutrient sources required for cellular growth; The metabolic pathways for substrates common in environmental systems.
5. Introduction to Biodegradation and growth kinetic models.

❖ WWM 113 : Quality Characteristics of Wastewater

- **Quality Characteristics of Wastewater: 4 credits (60 hours); L, T, P, SPW**

1. Physical Characteristics of Wastewater: Turbidity, Color, Oder, Total solids, Temperature
2. Chemical Characteristics of Wastewater: COD, TOC, Nitrogen, Phosphorus, Chlorides, Sulfates, Alkalinity, pH, Heavy metals, trace elements, and Priority pollutants.
3. Biological Characteristics of Wastewater: BOD, Oxygen required for nitrification, and Microbial population.
4. Contaminants Typically Found in Untreated Wastewater: Organic contaminants; Inorganic; contaminants; Pathogens and Other contaminants.
5. Total Solids in wastewater: Dissolved Solids, Suspended Solids, Settleable Solids; Floatable Solids;

6. The measurement of water quality parameters in water and wastes.
7. The behavior of contaminants in ground and surface water.
8. Types of wastewaters: Domestic wastewater, storm water and urban runoff; Industrial wastewater; Agricultural wastewater

❖ WWM 114 : Sustainability, Population and Sustainable Development Practices / Environmental Engineering System

➢ Sustainability, Population and Sustainable Development Practices: 2.5 credits (37.5 hours); L, T, P, SPW

1. Understanding Environment, Development and Sustainability: Concepts of global change under the context of development and globalization and impact on local environment; impacts on bio-physical and socio-economic conditions of various systems and sectors in society;
2. Social Impact on water resources: Development issues in terms of social phenomena, dynamic development and process of social cultural, economic and environmental changes; development patterns effecting natural water
3. Urban Development and Planning: Factors influencing water utilities and the role and expansion directions of urban settlements at different levels of community.
4. Utilization of water as a renewable Resources and managing water resources in a Changing Climate
5. Adaptation Policy Framework: adaptation policy to climate change and measures in a sustainable development context; adaptation and strategies at different levels and sectors in society to better manage future risk
6. Vulnerability Study of urban water resources for Sustainable Development Planning
7. Strategic environmental assessment: A systematic process for evaluating and anticipating the consequences of decisions taken prior to the project stage to ensure that environmental considerations and alternatives are addressed

➢ Environmental Engineering System: 2.5 credits (37.5 hours); L, T, P, SPW

1. Unit operations and processes encountered in the environmental engineering
2. Impact of regulations on wastewater engineering
3. Health and environmental concerns in wastewater management.
4. Wastewater reclamation and reuse

5. Understanding the factors that control species behavior in environmental systems
6. Foundation for estimating pollutant concentrations and their fate in the environment.
7. Analytic and Sampling of Wastewater
8. Analysis of Environmental data and information.

❖ WWM 115 : Sources and Type of Wastewater

- **Sources and Type of Wastewater 5 credits (75 hours); L, T, P, SPW**

1. Agriculture and aquaculture sources
2. Domestic wastewater sources
3. Industrial sources
4. Urban, Recreation and landscape sources
5. Sensitive areas: eutrophic, bathing and shellfish waters
6. Intermittent discharges, from combined sewer overflows or emergency overflows
7. Standards for parameters monitored in effluent from treatment plants.
8. Water order Consent
9. Point source pollution from industrial discharge
10. Diffuse source pollution: from surface water drainage, urban run-off from Brownfield sites, (former industrial sites that often have contaminated toxic soils that can also leach pollutants to waters), roads, and run-off from land in rural areas.
11. Quality of surface water drainage: urban waters pollution (petrol, oil, grease and metals from vehicles, and pathogens from misconnections of foul sewerage or from dog-fouling of roads).
12. Material flows in domestic wastewater.
13. Yellow water as fertilizer.
14. Brown water as soil conditioner.

❖ WWM 116 : Surface Hydrology

- **Surface hydrology: 4 credits (60 hours); L, T, P, SPW**

1. Storm run-off process: General description. Horton theory, variation of components with time. Saturated surface flow, through flow, partial area run off, and occurrence of different processes. Catchment storage, channel transmission losses.
2. Storm rainfall-run-off relationships: variation of components of run-off cycle during storm, initial loss, storm rainfall-run-off relationships and models, design case.

3. Rational method of flood estimation: basis, run-off coefficient, time of concentration, deterministic and statistical interpretations, application.
4. Hydrograph analysis: description, factors affecting hydrograph shape, storage effects, lag, and component flows, hydrograph separation.
5. Flood frequency studies: method, 'data required extension of data, types of distributions, estimation of population from sample, applications.
6. Hydrograph synthesis by run-off routing: principles, computational models of rainfall excess input and of catchment storage, evaluation of model parameters for practical application of models, application to computation of hydrographs for selected models.
7. Introduction, storage yield analysis: regulation for water supply, storage analysis using simulation studies of historical or synthetic records, graphical and numerical techniques, concept of probability of failure.

❖ WWM 117 : Bilingual Training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

6. **Vocabulary**
   - Technical and usual vocabulary of the specialty
7. **Grammar**
8. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
9. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
10. **Write clear, detailed texts**
    - Essay writing;
    - Application for employment;
    - C.V;
    - Letter of motivation;
    - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**

2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ WWM 121 : Technical Statistical Methods

➢ **Technical Statistical Methods: 4 credits (60hours); L, T, P, SPW**

1. Introduction to probability
2. Statistical models and probability distributions
3. Estimation, errors and uncertainty
4. Hypothesis testing
5. Linear models & Regression
6. Binomial & Poisson processes
7. Introduction to statistical/data analysis software
8. Introduction to Visualization
9. Principles of Visualization
10. Plotting and visualization techniques
11. Trade offs in visualization

❖ WWM 122 : Introduction to Fluid Mechanics/ Hydraulics

➢ **Introduction to Fluid Mechanics/ Hydraulics :5 credits (75 hours); L, T, P, SPW**

1. **Introduction to Fluid Mechanics**
   - Physics of Fluids: Nature of fluids, Fluid as a continuum, Properties of fluids,
   - Fluid statics: pressure, pressure at a point, pressure variation in a static fluid, pressure and head, use of hydraulic pressure, buoyancy
   - Basics of Fluid Flow: Velocity field, Continuity of flow, Types of flow, Bernoulli equation, Physical meaning of the Bernoulli equation, Applications of Bernoulli equation, Linear Momentum
   - Laminar and Turbulent Flow: Laminar Flow, Turbulent flows
   - Viscous Flow in Pipes: Laminar flow in a circular pipe, Turbulent flow in a pipe, Bernoulli Equation revisited, Losses in pipes, other head losses in pipes
   - Pumping of liquids: Pump classification, Centrifugal pumps, Bernoulli's equation and system head, System curve, Net Positive Suction Head, Flow Control
2. **Hydraulics**
   - Fluid properties: Introduction: Fluids, continuum and density, Viscosity, surface tension and pressure
   - Hydrostatics : Hydrostatic pressure and the hydrostatic equation; Pressure measurement; Hydrostatic force on a plane surface; Buoyancy and Archimedes Principle; Hydrostatic force on a curved surface
   - Kinematics and continuity: Conservation of mass
   - Energy and momentum: Principles; Conservation of energy: Bernoulli's Equation; Bernoulli's Equation: Applications to flow measurement; Momentum principle: control volumes; Momentum principle: open channel flow
   - Pipe flow: Reynolds Experiment: Laminar and turbulent flow; Flow from static reservoir (no energy losses); Turbulent flow and head loss; other head losses
   - Energy and momentum: further applications; Sharp expansions and orifice meters; Momentum principle, effects of gravity
   - Analysis of hydraulic components of engineering projects: flow in closed conduits and open channels, introduction to engineering hydrology, the hydrological cycle and development of hydrographs.

❖ WWM 123 : Surveying and Leveling/ GIS and Remote sensing

➢ **Surveying and Leveling :2 credits (30hours); L, T, P, SPW**

1. Introduction to Surveying: definition; importance, types of survey.
2. Surveying Instruments: chains, tapes, steel bands, their types and uses, GPS.

3. Compass Surveying: prismatic compass and surveyor compass, uses, bearing, local attraction, fieldwork and plotting.
4. Plane Table Surveying: parts and accessories, methods of plane table surveying and topographic mapping, contour map preparation and uses, contour lines, two point and three point problems.
5. Introduction to Leveling: definition, benefits, general principles and methods of leveling, types and uses of levels, trigonometric leveling, leveling instruments/equipment, temporary and permanent adjustments of levels, computation of areas and volumes, precision land leveling, land grading, cut-fill ratio and earthwork calculations, measurement of area, cross-section, elevations, contour lines, mass diagram, planimeter and its uses.
6. Modern Survey Instruments: total station, theodolites, electronic distance measurement (EDM), GPS, temporary and permanent adjustments, measurement of horizontal and vertical distances and angles,

➢ **GIS and Remote sensing: 2credits (30hours); L, T, P, SPW**

1. Comprehensive principles of GIS, functional components of GIS, limits of GIS, GIS data models: vector data model, raster data model.
2. Spatial Data Acquisition and Management: data acquisition techniques, data quality and assessment, accuracy, precision; map reference system, map projections, coordinate systems, properties of map projection, types of map projection, map datum.
3. GIS Database Management Systems: what is database, advantages of database, components of DBMS.
4. Global Positioning System (GPS): brief history, components of GPS, how GPS work, GPS errors, absolute positioning, differential positioning, GPS applications.
5. Spatial Analysis: what is spatial analysis, application areas, vector overlay analysis; buffering, map overlay, dissolve, clip, merge, select, eliminate, update, erase, and split tools; raster overlay analysis; high value vs. low value, top map vs. bottom map, factor combination model in raster GIS.
6. Remote Sensing: why remote sensing, how remote sensing works, major component of remote sensing, remote sensing platforms and sensors, characteristics of optical sensors, earth resource remote sensing satellite, remotely sensed data characteristics: spectral, radiometric, spatial and temporal resolution, spectral signatures

❖ WWM 124 : Industrial Wastewater Pollution, Prevention and Control

➢ **Industrial Wastewater Pollution, Prevention and Control**

1. The types of industrial waste water: Inorganic industrial wastewater, Organic industrial wastewater

2. The amounts of industrial wastewater
3. The effects of industrial wastewater, the effects of inorganic pollutants from industrial wastewater, the effects of organic pollutants from industrial wastewater, Other factors related to the effect of industrial wastewater
4. Pollution Prevention and Backflow Prevention
5. Industrial Pollution Abatement through preventive strategies
6. Chemical Risk Management, Confined Space Safety, Energy Efficiency
7. Hazardous Products and Waste, Operator Certification, Permits
8. Pretreatment, Safety for Wastewater Systems
9. Sludge Biosolids, Used Oil Recycling and Disposal
10. Wastewater Contacts, Wastewater Laboratories, Wastewater System Management
11. Development and Promotion of Cleaner Technologies

❖ WWM 125 : Collection and Transport of Wastewater

➢ **Collection and transport of wastewater: 4 credits (60 hours); L, T, P, SPW**

1. Types of sewer systems: Combined Sewers, Separate Sewers, Simplified Sewers, Solid free sewers, Pressurised sewers, Vacuum sewers, Open channel drains
2. Principles of collection: Combined, Separate, above ground/underground systems
3. Principles of transport: Gravity, Pressure, Vacuum
4. design aspects of sewers systems
5. Cost and health aspects of sewer systems
6. Operation, Applicability and Maintenance of sewers systems
7. Working Principle of Pressurized and Vacuum Sewers

❖ WWM 126 : Short Internship Report

Short Internship Report: 5 credits (75 hours); L, T, P, SPW

❖ WWM127: Communication Skills /Computer Programming

➢ **Communication Skills /Computer Programming: 3 credits (45 hours); L, T, P, SPW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

- Introduction: Computer components, operating system, software & applications

- Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

1. Demonstration of computer components and Windows installation.
2. Exercise on the use of word processing, spreadsheet and engineering graphics.
3. Programming of engineering problems with C++.

❖ WWM231: Fundamentals of industrial chemistry

- **Fundamentals of industrial chemistry: 4 credits (60 hours); L, T, P, SPW**

- Chemical Technology: Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid liquid extraction, separation by absorption and adsorption. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry. Introduction to clean technology.

- Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

- Inorganic Chemicals: Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate.

- **Industrial Metallurgy**

Preparation of metals (ferrous and nonferrous) and ultra pure metals for semiconductor technology.

Environment

(a) Air Pollution: Pollutants and their sources, pollution by SO2, CO2, CO, NOx, H2S and other foul smelling gases. Methods of estimation of CO, NOx, SOx and control procedures. Green House effect and Global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and Halogens, removal of sulphur from coal. Control of particulates.

(b) Water pollution and Water Quality Standards: Pollutants and their sources, Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluent from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, agro, fertilizer, etc. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Practice:

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)

4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method. (AgNO3 and potassium chromate)
6. Estimation of total alkalinity of water samples (CO3, HCO3) using double titration method.
7. Measurement of dissolved CO2.
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

❖ WWM 232 : Computer for Business

➢ **Computer for Business: 5 credits (75 hours); L, T, P, SPW**

Objectives

At the end of the course, the student should be able to:

- Know related computing concepts ;
- Have practical hands on using computers.

Course content

1. Introduction, historical background ;
2. Types of computers and application areas;
3. Impact of computers on society;
4. Current notions e.g., information society and globalisation;
5. Outline computer organisation (block structure of computers);
6. Explanatory definitions and examples of basic hardware, software and networking;
7. Explanatory definitions and procedures in using Computer systems (e.g. E-mail, WEB page access/download, file transfer). Information Services; e-commerce, mention assorted internet related protocols and standards e.g. http, ftp, html.
8. Office automation, introductory use of word processor, graphics and spread sheet packages, database access;

❖ WWM 233 : Basic Wastewater Treatment Processes

➢ **Basic Wastewater Treatment Processes: 4 credits (60 hours); L, T, P, SPW**

1. Design principles of physico-chemical treatment units
2. Aeration-theory of gas transfer; design of cascade and spray aerators.
3. Coagulation and flocculation-Design criteria and principles of hydraulic and mechanical flash mixers and flocculators; design of clari-flocculator; concept of tapered velocity gradient and sludge blanket clarifier.

4. Sedimentation-Analysis of discrete and flocculent particle settling, concept and design of high rate sedimentation techniques; design of tube settlers.
5. Filtration-Design of filter media for slow and rapid sand filters; backwash and sand bed expansion; hydraulic of filtration.
6. Specific treatment methods-Design of equalization and neutralization tank; removal of oil and grease.
7. Design principals of biological treatment Aerobic process-kinetics of biological growth; Design of activated sludge process and its modifications; oxygen transfer and design of aerators.
8. Anaerobic treatment-High rate anaerobic treatment processes; sludge stabilization and design of anaerobic digesters.
9. Industrial wastewater treatment processes Introduction-magnitude of industrial pollution, their characteristics and impacts; selection procedure for physical, chemical and biological methods of industrial wastewater treatment

❖ WWM 234 :Waste Water Quality Assessment Techniques

➢ **Waste water quality assement techniques: 5 credits (75 hours); L, T, P, SPW**

1. Evaluation of Data at the Station Level: Evaluation of Physical and Chemical characteristics of wastewater, Pathogenic and Biological Indicators, Assessment of Nutrient Impacts
2. Evaluating from Multiple Stations within an Assessment Unit
3. Designated Use Assessment Methods: Aquatic Life Use Assessment Method, Recreational Use Assessment Method, Fish Consumption Use Assessment Method, Shellfish Harvest For Consumption Use Assessment Method , Drinking Water Supply Use Assessment Method , Industrial Water Supply Use Assessment Method , Agricultural Water Supply Use Assessment Method
4. Delisting Assessment Unit/Pollutant Combinations
5. Method to Rank and Prioritize Assessment Units; Method for Developing the Monitoring and Assessment Plan
6. Wastewater management and associated hygienic risk: Conventional sanitation, Ecological sanitation, Sustainable Sanitation.
7. Resource management sanitation: Treatment systems for brown and black water, Treatment systems for grey water, Treatment systems for yellow water

❖ WWM 235 : Integrated Water Resource Management

➢ **Integrated water resource management: 5 credits (75 hours); L, T, P, SPW**

1. Water resources and urbanization: Wastewater, Water quantity and quality, Ecosystem services, Policy responses, Economic costs and benefits.
2. The climate change challenge: Climate change and water supply, Climate change and sanitation, urban contributions to climate change, Response options
3. Traditional Waste Management, Conventional urban water management
4. Integrated Resource Management Approach
5. Resource Recovery Technology and Opportunities
6. Sustainable Liquid Waste Management Plan: Governance, Roles and Responsibilities, Scope of the Plan, Linkages and Alignment
7. Goals, Strategies, Actions and Measures: Protect public health and the environment, Use liquid waste as a resource, Effective, affordable and collaborative management, Financial Plan, Performance Measures

❖ WWM 236 : Water Pollution Control

➢ **Water pollution control: 4 credits (60 hours); L, T, P, SPW**

Introduction: Properties of water and its use, world water resources, water movement in the environment, water quality concerns, classes of agricultural pollutants, quantitative description of water quality, water quality as global issue. *Factors Affecting Water Quality*: temperature, precipitation, soil, cropping practice, irrigation, characteristics of receiving water. *Pollutant Delivery Process:* adsorption characteristics, availability, detachment, transportation, pathways. Agriculture Pollutants: agriculture runoff as non-point pollution source, sediment pollution problems, plant nutrient, fertilizers, nitrogen fertilizers, phosphorus fertilizers, plant nutrient pollution problems, eutrophication; chemicals usage as pollution problem in agriculture, pesticides, herbicides, insecticides and fungicides, animal waste, salinity, biological water quality problems. *Water Pollution Control:* methods of controlling nutrients, sediments, animal waste, salts, and pesticides related pollution. *Water Quality Standards:* effluent, surface, stream, irrigation

❖ WWM 237 : Economy and business Management / Civics and Ethical Education

➢ **Economy and Management of businesses**: **2 credits (30 hours); L, T, SPW**

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies

3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ WWM 241 : Wastewater Regulation

- **Wastewater Regulation: 5 credits (75 hours); L, T, P, SPW**

❖ WWM 242 : Design of Wastewater Treatment Systems

- **Design of Wastewater Treatment Systems: 4 credits (60 hours); L, P, SPW**

1. Wastewater Treatment Systems and Characteristics of Wastewater
2. Microbiology and ecology of wastewater treatment
3. Reaction kinetics and reactor hydraulics
4. Conversion processes of organic and inorganic matter
5. Preliminary Treatment of Wastewater
6. Primary Treatment of Wastewater
7. Secondary Treatment of Wastewater: Treatment Ponds, Trickling Filters, Rotating Biological Contactors
8. Secondary Treatment of Wastewater: Activated Sludge
9. Anaerobic Treatment
10. Tertiary Treatment of Wastewater (Advanced Treatment),
11. Disinfection, Sludge Treatment and Disposal
12. Natural Treatment of Wastewater, Process Control
13. Wastewater Treatment Plants.
14. Sedimentation: Types of settling, Discrete settling, Flocculent settling, Zone settling
15. Aeration: Fundamentals of gas transfer, Kinetics of aeration, Factors of influence in oxygen transfer, Oxygen transfer rate in the field and under standard conditions, Other aeration coefficients, Mechanical aeration systems, Diffused air aeration systems, Aeration tests, Gravity aeration

❖ WWM 243 : Environmental Processes Monitoring/ Biotechnology in Waste Management

- **Environmental processes monitoring/Biotechnology in waste management: 4 credits (60 hours); L, T, P, SPW**

❖ WWM 244 : Waste water treatment and Reuse processes

- **Waste water treatment and Reuse processes: 3 credits (45 hours); L, T, P, SPW**

Physical, chemical and microbiological quality of water, Water quality management strategies. Fundamentals of chemical reactions. Chemical oxidation and reduction, Coagulation, Mixing, and Flocculation, Gravity Separation, Granular filtration, Membrane Filtration, Deisinfection, Reverse osmosis. Ion exchange .Introduction to

wastewater, Wastewater constituents, Wastewater characteristics, Wastewater treatment processes, Wastewater removal plants, Nutrient removal from waste water. Sludge handling and disposal, Industrial wastewater source control, Urban storm water Management.

❖ WWM 245 : Chemical analysis for environmental /microbiology laboratory

- **Chemical analysis for environmental /microbiology laboratory: 5 credits (75 hours); L, T, P, SPW**

1. **Chemical analysis for environmental**
   - Purification and Separation: Sample preparation (isolation using a suitable solvent, extraction and separation), Solvent extraction. Distillation (simple, fractional and vacuum distillation), Crystallization. Chromatographic separation: High Performance Liquid Chromatography (HPLC), Gas Liquid Chromatography (GLC), Gas Chromatography (GC), Ion Exchange Chromatography.
   - Composition Analysis: Elemental analysis both qualitative and quantitative.
   - Physical Characterization: Strength, Viscosity, Rheological properties, Molecular weight.
   - Spectroscopic Methods: Ultraviolet Spectrophotometery (UV), Visible Spectro photometery, Infrared Spectrophotometery (IR), Nuclear Magnetic Resonance Spectroscopy (NMR) and Electron Spin Resonance Spectroscopy (ESR), Flame Photometry, Atomic Absorption Spectroscopy (AAS), Induced Couple Plasma Spectroscopy (ICP), Atomic Fluorescence
   - Spectroscopy.
   - E. Electro Analytical Techniques: Potentiometery, Voltametry, Polarography, Amperometry, Coulometry and Conductometry.
   - F. Thermal Methods of Analysis: Thermal Gravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetery (DSC), Thermal Mechanical Analysis (TMA). G. STANDARDS: ISI, BTS, ISO, EURO, ASTM.
2. **Practical Industrial Chemistry**
   - Determination of composition of dolomite (by complexometric titration).
   - Thermal Characterization of the following: (Demonstration exercise)
   - Dolomite (for percentage composition by TGA)
   - Polystyrene (for glass transition temperature by DTA)
3. **Microbiology laboratory**
   - Lab Procedures; Microscopy; Scientific Inquiry; Preparation of Microorganism Stains and Wet Mounts; Sampling Environments.
   - Bacterial Morphology, Structures, Motility; & Culture Techniques
   - Media Preparation; Bacterial Culture Characteristics & ID

- Biochemical Characteristics; Mutations in Microbes; and
- Fungi and Protozoa
- Environmental Transfer of Organisms; Indigenous Flora;
- Culture Handling

❖ WWM 246 : Long Term Professional Internship Report/ Defence

- **Long term professional internship report/ Defense: 6 credits (90 hours); P, SPW**

❖ WWM 247 : Environmental Policy and Ethics

- **Environmental policy and ethics: 3 credits (45 hours); L, P, SPW**

Institutional aspects and people's participation. Water use and water market, Water and ethics, Water and poverty, Water and gender issues, Water conflicts and corporation, Water policies and procedures, Legal and Institutional requirements for water resource management, Water allocation laws, Environmental issues of water quality and quantity.

Field : WATER ENGINEERING AND MANAGEMENT

Specialty :

HYDRAULIC ENGINEERING WATER INFRASTRUCTURE

Field:	WATER ENGINEERING AND MANAGEMENT

Specialty:	Hydraulic Engineering and Water Infrastructure

1. The objective of the training

This specialty aims to train senior technicians capable of working in the field of treatment, transport, distribution, and sanitation and water purification. They ensure the proper functioning of water treatment plants and ensure the capture, treatment and distribution of water intended for consumption or industrial use.

2. Expected skills

→ **Generic skill**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.

→ **Specific skill**

- Technical management of the structures (control and operation of network operating installations, maintenance);
- Information management;
- Study and technical supervision;
- Quality assurance;
- Responsible for a business unit in a large company.

3. Career opportunities

- Decentralized territorial units
- Water distribution companies;
- Consultancies and research teams;
- Suppliers of materials, specialized agencies and administrative units

4. Organization of teachings

- **FIRST SEMESTER**

Field: **Water engineering and management**		Specialty: Hydraulic Engineering and Water Infrastructure					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYE111	Mathematics I	40	15	15	5	75	5
HYE112	Physics I	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYE113	Fluid mechanics	30	15	10	5	60	4
HYE114	Fondamental of Hydraulic	40	20	10	5	75	5
HYE115	Control automatic-regulation and Teleprocessing of hydraulic systems	40	20	10	5	75	5
HYE116	Analysis and quality of water	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYE117	Bilingual training	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: **Water engineering and management**		Specialty: Hydraulic Engineering and Water Infrastructure					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYE121	Statistics	40	15	15	5	75	5
HYE122	Project Management	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
HYE123	Water Resource management	40	20	10	5	75	5
HYE124	Water Treatment	30	15	10	5	60	4
HYE125	Workshop and Internship of impregnation in a Center meteorological station	40	20	10	5	75	5
HYE123	Water Resource management	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYE127	Initiation to water Law/ Civic education and Ethics/	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: **Water engineering and management**		Specialty: Hydraulic Engineering and Water Infrastructure					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYE231	Mathematics II	30	15	10	5	60	4
HYE232	Physics II	40	15	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
HYE233	Surveying and Leveling	30	15	10	5	60	4
HYE234	Open channel hydraulics	40	20	10	5	75	5
HYE235	Irrigation hydraulics	40	20	10	5	75	5
HYE236	Electrical Engineering	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYE237	Economy and Business management	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: **Water engineering and management**		Specialty: Hydraulic Engineering and Water Infrastructure					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
HYE241	Economics and Management	30	15	10	5	60	4
HYE242	Statistics and Probability	40	10	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
HYE243	Hydraulics for environmental engineering	30	15	10	5	60	4
HYE244	Basics of hydraulics and pumps	30	15	10	5	60	4
HYE245	Hydraulics structures	30	15	10	5	60	4
HYE246	Professional Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
HYE247	Computer and MultiMedia	20	10	10	5	45	3
Total		**180**	**80**	**130**	**60**	**450**	**30**

5. Courses content

❖ HYE 111: Mathematics I

- **Mathematics I: 5 credits (75 hours); L, T, P, SPW**

Objectives
At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

1. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
2. **Use of measures on the farm**
   - Linearmeasures
   - Square measure (area)
   - Cubic measure (volume)
   - Square roots
3. **Weights and their use**
4. **Trigonometric calculations**
5. **Measurement conversions**
6. **SI-units. Significant figures**

❖ HYE 112: Physics I

- **Physics I: 4 credits (60 hours); L, T, P, SPW**

SI-units. Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young- interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle, continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

❖ HYE 113:Fluid mechanics

- **Fluid mechanics : 4 credits (60 hours); L, T, P, SPW**

Objective: To study the fundamentals of fluid mechanics including statics and kinematic, concept of energy, momentum, forces and flow

- **Fundamentals of Fluid Mechanics:** Definition and branches of fluid mechanics, distinction between solid and fluids,
- Properties of fluids: density, viscosity, surface tension, specific weight, specific gravity, etc., bulk modules of elasticity, compressibility of fluids.
- **Fluid Statics:** Pressure variations in a fluid, pressure measuring devices, gauges and manometers, buoyancy and stability of submerged and floating bodies, forces on plane and curved surfaces, center of pressure.
- **Fluid Kinematics:** Types of flow, dimensions of flow, streamlines, path lines, flow patterns for different references, continuity equation, source flow, sink flow, flow nets, uses and limitations of flow net.
- **Energy Consideration in Steady Flow:** General equations of steady flow, heads, Bernoulli's equation and its practical applications, hydraulic and energy grade lines, power consideration in fluid flow, cavitations, head losses, solution of flow problems.
- **Momentum and Forces in Fluid Flow:** Impulse-momentum principle and application, force exerted on a stationary and moving bodies (flat and curved), relation between absolute and relative velocities, reaction of a jet, jet propulsion, torque in rotating machines.
- **Fluid Flow Measurements:** Orifices, weirs, notches and venture meter, pilot tube, coefficient of contraction, velocity and discharge, derivation of their discharge formulae and their applications.

❖ HYE114 : Fundamental of Hydraulics

- **Fundamental of Hydraulics: 5 credits (75 hours); L, T, P, SPW**

1. Fluid properties : Introduction: Fluids, continuum and density, Viscosity, surface tension and pressure
2. Hydrostatics : Hydrostatic pressure and the hydrostatic equation; Pressure measurement; Hydrostatic force on a plane surface; Buoyancy and Archimedes Principle; Hydrostatic force on a curved surface
3. Kinematics and continuity: Conservation of mass
4. Energy and momentum: Principles; Conservation of energy: Bernoulli's Equation; bernoulli's Equation: Applications to flow measurement; Momentum principle: control volumes; Momentum principle: open channel flow

5. Pipeflow : Reynolds Experiment: Laminar and turbulent flow; Flow from static reservoir (no energy losses); Turbulent flow and head loss; other head losses
6. Energy and momentum: further applications; Sharp expansions and orifice meters; Momentum principle, effects of gravity
7. Analysis of hydraulic components of engineering projects: flow in closed conduits and open channels, introduction to engineering hydrology, the hydrological cycle and development of hydrographs .

❖ HYE 115: Automatic control-regulation and teleprocessing of hydraulic systems

- **Automatic control-regulation and teleprocessing of hydraulic systems : 5 credits (75 hours); L, T, P, SPW**

1. Types of Automatic Control hydraulic systems: Pressure Reducing; Pressure Relief/Sustaining; Pump Control; Rate of Flow Control, Level Control; Cavitations Control ;Surge Anticipation; Electronic Control; Metering; Valve- Based Power Generation
2. Line Pressure to Open; Line Pressure to close
3. Flow Direction
4. Pressure Relief/Pressure Sustaining Valves
5. Pump Control Applications

❖ HYE 116: Analysis and quality of water

- **Analysis and quality of water: 4 credits (60 hours); L, T, P, SPW**

Individual indexes for determination of chemical content of water: pH and pOH dissolved oxygen Hydrogen sulfide and sulfides Acidity and alkalinity Components of carbonate system Chlorides and sulphates Hardness of water Potassium and sodium Calcium and magnesium Ammonia and ammonia salts Nitrates and nitrites Phosphates and polyphosphates Sillicium Iron Microelements (Mn, Cu, Zn, Co, Mo)

Composition of rainwater, Surface water and groundwater, introduction to physico-chemical properties of water; Weathering and water chemistry, Quality of water, Water quality standards, Causes and concepts of pollution of water, Groundwater and, Inorganic chemicals and organic compounds in water, Urban and highway diffuse pollution, Industrial water pollution, Agricultural diffuse pollution, Water quality and health, Water quality monitoring as an information system: Sample collection, laboratory analysis, data handling, data analysis, reporting, and information utilization, Total coli form test in drinking water by multiple fermentation tube method.

❖ HYE 117: Bilingual training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.
3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;

- Communication orale courante ;
- Communication orale interactive ;
- De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
- Lecture rapide et compréhension de texte ;
- Synthèse de texte
- De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
- Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
- Expressions figées

❖ HYE 121: Statistics

- **The statistics : 5 credits (75 hours); L, T, P, SPW**

Objective:
Students will learn relevant statistical tools and techniques to collect analyse and present data
Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. Definition
2. Why study statistics
3. Uses of statistics
4. Elements of statistics
5. Sources and methods of data collection
6. Introduction
7. Sources of data
8. Methods of data collection
9. Errors in data collection
10. Methods for describing sets of data
11. Introduction
12. Tables
13. Graphics methods of data presentation
14. Data analysis
15. Introduction
16. Ratios and percentages in demography
17. Measures of location
18. Measures of variability
19. Interpreting the standard deviation

20. Other numerical measures
21. Simple linear regression and correlation
22. Introduction
23. Some definition
24. Scatter diagram
25. Regression line
26. Correlation coefficient
27. The normal distribution

❖ HYE 122: Project Management

- **Project Management: 4 credits (60 hours); L, T, P, SPW**

1. Technical aspects to project management
2. The construction project life cycle
3. Managerial aspects of project management
4. Project organization

❖ HYE 123: Water Resource Management

- **Water Resource Management: 5 credits (75 hours); L, T, P, SPW**

1. Distribution of water on planet Earth, Hydrologic cycle, Renewable water resources, Time and space variability, Initial data and methodological approaches Continents, Natural-economic regions and countries, River basins, Inflow to the world Oceans. River runoff and underground water. Use of water resources, Principal water users and tendencies of their development, Assessing and forecasting global water use. Water availability and water resources deficit, Historical perspective of water and development, Anthropogenic changes in global climate and water resources. Ways of eliminating fresh water deficit in the world.
2. Measurement of economic values of water
3. Water Gouvernance and Law

❖ HYE 124: Water treatment

- **Water treatment : 5 credits (75 hours); L, T, P, SPW**

1. Reasons for the treatment of drinking water
2. Overview of basic water treatment processes: oxidation, coagulation, -flocculation, sedimentation, granular media filtration, membrane filtration, adsorption, disinfection;

3. Application of surface water treatment systems: conventional treatment, two-stage filtration, direct filtration, slow sand filtration, membrane filtration, granular activated carbon contactors;
4. Application of groundwater treatment systems: conventional greensand treatment, direct greensand treatment, fixed bed adsorption processes;
5. Application of specialized water treatment processes: hardness treatment, taste and odor treatment, fluoridation processes;
6. Internal corrosion control;
7. Water heating systems;
8. Testing and reporting requirements for systems: filtration systems, disinfection systems, fluoridation systems and water heating systems.

❖ HYE 125: Workshops and internship of impregnation in a center/ meteorological station

- **Workshops and internship of impregnation in a center/ meteorological station: 5 credits (75 hours); L, T, P, SPW**

❖ HYE 126: Initiation to GIS

- **Initiation to GIS : 4 credits (60 hours); L, T, P, SPW**

Introduction to remote sensing, Principles of remote sensing, Remote sensing systems, Digital image processing, Concepts of GIS, Spatial data: sources, acquisition and entry, Database, Vector and raster data, Data analysis, GIS output, Integration of remote sensing and GIS, Application of remote sensing and GIS in water resources modeling and management

❖ HYE 127: Initiation to water law/ Civic Education and Ethics

- **Initiation to water law: 2 credits (30 hours); L, T, SPW**

1. **Water policy and governance:**
   - Policy actors and instruments;
   - Policy evaluation tools;
   - Water institutions and governance;
2. **Water laws and institutions:**
   - The principles of Cameroonian's water laws;
   - Cameroonian's water institutions and legislations;
   - The translation of the water law into policies

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ HYE 231: Mathematics II

- **Mathematics II: 4 credits (60 hours); L, T, P, SPW**

Finite differences: Difference tables, forward, backward and central differences; Linear systems: Matrix methods, Gaussian elimination. Gauss-Seidel, ill–conditioning; Errors: Sources, estimates, propagation, floating point arithmetic; Operators; Curve fitting; Interpolation: Lagrange, Newton's forward and backward; Euler and Runge-Kuta methods; Collation polynomials; Newton-Raphson.

❖ HYE 232: Physics II

- **Physical II: 5 credits (75 hours); L, T, P, SPW**

❖ HYE 233: Surveying and Leveling

- **Surveying and Leveling: 4 credits (60 hours); L, T, P, SPW**

Objective:
To enable students to understand theory and practice of land surveying and leveling.

To develop skills to use modern survey instruments for above objective.

Contents:

1. Introduction: Surveying instruments; Chains, Tapes, Steel Bands, their Types and Uses
2. Chain Surveying: Ranging and chaining of survey Lines. Fieldwork and plotting of chain survey.
3. Compass Surveying: Prismatic Compass and Surveyor Compass, Uses, Bearing, Local Attraction, Fieldwork and Plotting
4. Plane Table Surveying: Parts and Accessories, Methods of Surveying, Two Point and Three Point Problems
5. Leveling: General Principle, Types of Levels and their temporary and Permanent Adjustments, Methods of Leveling, Reduction of Level, Precise Leveling and Trignometric Leveling
6. Theodolite: Types and uses of Theodolites, Temporary and Permanent Adjustments, Measurement of Horizontal and Vertical angles
7. Tachometrical Surveying: Methods of Tachometric Surveying. Fieldwork and computations.
8. Traversing: Traversing with Prismatic Compass, Theodolite and Plane Table, Computations and Adjustments of Traverse, Transformation of Co-ordinates
9. Calculation of Areas And Volumes: Earth work calculation, D.M.D method, Simpson rule and Trapezoidal rule

Practicals:

1. Practice on measurement of distances and introduction to measuring instruments
2. Chain Surveying and plotting
3. Compass Traversing
4. Plane Table by methods of radiations and intersections
5. Two Points Problem

❖ HYE 234: Open Channel Hydraulics

- **Open Channel Hydraulics : 4 credits (60 hours); L, T, P, SPW**

Objective:

To study the basic concepts of fluid flow, principles of energy and momentum, and characteristics of different hydraulic structures used in open channel.

Contents:

- **Basic Concepts of Fluid Flow:** Types, state and regimes of flow, channel flow types, channel geometry, measurement of velocity in channel, velocity distribution in channel and its coefficients, pressure distribution in channel, effect of slope on pre4ssure distribution.

- **Energy and Momentum Principle:** Basic equations, specific energy, specific energy and alternate depths, criteria for a critical state of flow, computation of critical flow, control of flow, application of flow control in rectangular channel, momentum in open channel flow, specific momentum, and hydraulic jump.
- **Uniform Flow:** Establishment of uniform flow. The Chezy's and Manning's equations, resistance coefficient estimation, normal depth and velocity, normal and critical slopes, free board, best hydraulic section, determination of section dimensions.
- **Rapidly Varied Flow:** Characteristics of varied flow, sharp crested weir, aeration of the nappe crest shape and discharge over spillway, type and characteristics of the hydraulic jump, jump as energy dissipater, flow through sudden transitions.

Practical:

- Determination of discharging in open channel through different methods.
- Development of stage-discharge curve (Y-Q Relationship)
- Development of hydraulic jump
- Flow through/over different hydraulic structures
- Determination of critical flow, critical depth, alternative depth
- Determination of Chezy and Manning n for a rectangular prismatic channel Plotting flow profile of an open channel

❖ HYE 235: Irrigation Hydraulics

➢ **Irrigation Hydraulics : 5 credits (75 hours); L, T, P, SPW**

1. Introduction to irrigation
2. Soil water characteristics
3. Water source for irrigation
4. Evapotranspiration
5. Irrigation system components
6. Irrigation calculations; Hydraulic calculations
7. Evaluating irrigation efficiency for a specific irrigation system
8. Irrigation uniformity
9. Irrigation scheduling tools

❖ HYE 236: Electrical Engineering

➢ **Electrical Engineering: 4 credits (60 hours); L, T, P, SPW**

Introduction to Single-Phase Circuits, Power Calculations, Magnetic Circuits, Mutually Coupled Circuits, Transformers, Equivalent Circuit and Performance, Analysis of Three-Phase Circuits, Direct-Current Machines: Construction, Equivalent Circuit, Torque-Speed Characteristics, Applications; Induction Machines: Construction Equivalent Circuit, Torque-speed Characteristics, Speed Control, Starting, Applications

Synchronous Machines: Construction, Equivalent Circuit, Generator & Motor Operation Power Angle Characteristics, Hunting, Pull-Out, Stepper Motors and controls, Principles of Industrial Power Distribution.

❖ HYE 237: Economy and Business management

- **Economy and Business management of enterprises: 3 credits (45 hours); L, T, P, SPW**

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company
11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

❖ HYE 241: Economics and Management

- **Economy and Management: 4 credits (60 hours); L, T, P, SPW**

1. Forecasting, planning, control, organization, coordination, motivation and communication
2. Leadership, problem solving technics, human relation
3. productivity, work flow, cost optimization, flow graphs
4. work study, work measurement technics, incentives, wages, quality control, site meetings and organizational structure
5. Use of planning tools (PERT, GANTT) with application

❖ HYE 242 : Statistics and Probability

- **Statistics and Probability: 5 credits (75 hours); L, T, P, SPW**

Objective: Students will learn relevant statistical tools and techniques to collect, analyse and present data

Students gain knowledge on how to design, exploratory and secondary research, data collection, measuring attitudes, questionnaire design, sampling techniques and data analysis

1. **Statistical series of two variables and actual values**
   - Mathematical definition and presentation;
   - Covariance;
   - Graphical representation;
2. **Time series**
   - Definitions and Models;
   - Components;
   - Analysis and Forecasting.
3. **Basic elements of the theory of probabilities**
4. **Sampling and testing of hypotheses**
5. **Mastery statistical processes (MSP or SPC)**

❖ HYE 243: Hydraulics for environmental engineering

- **Hydraulics for environmental engineering : 4 credits (60 hours); L, T, P, SPW**

1. Hydrostatics, Pascal's principle, pressure and applications
2. Basic concepts of Energy and Head in Flow
3. Pipelines in Series and parallel,
4. Introduction to Pumping Systems
5. Water Hammer and Cavitations
6. Introduction to Open Channel Flow: qualitative difference from pressure flow. Concept of normal flow
7. Control Points and Hydraulic Profiles
8. Hydraulics and Treatment Plant Design

❖ HYE 244: Basics of Pumps and Hydraulics

- **Basics of Pumps and Hydraulics : 4 credits (60 hours); L, T, P, SPW**

1. Force, Pressure, and Head
2. Velocity and Flow Rate
3. Energy Losses
4. Open Channel Flow Measurement
5. Pressure Flow in Force Mains

6. Force Main Flow Measurement
7. Pump Types and Applications
8. Pump basics: purpose of pumps in wastewater treatment, Flow, Head, housepower and efficiency, Relationships and Calculation, Head/Capacity curve;
9. Centrifugal Pumps: Basic Components, types and applications, pump curve characteristics;
10. Positive displacement pumps: general description, types and applications, pump curve characteristics;

❖ HYE 245: Hydraulics structures

- **Hydraulics structures : 4 credits (60 hours); L, T, P, SPW**

1. Design of hydraulic structures: dams and levees, water distribution networks, water collection networks, storm water management,;
2. Watershed sediment budget
3. Sediment transport
4. Erosion control and protection structures
5. Flood control measures and structures
6. Storm water drainage design

❖ HYE 246: Professional internship

- **Professional internship: 6 credits (90 hours); P, SPW**

1. Arrival and Business Integration
2. Working in a company
3. Holding of the Intern journal
4. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
5. Elaboration of method of research
6. Resources to be exploites
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ HYE 247 : Computer and Multimedia

- **Computer and Multimedia: 3 credits (45 hours); L, T, P, SPW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

1. Introduction: Computer components, operating system, software & applications
2. Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

1. Demonstration of computer components and Windows installation.
2. Exercise on the use of word processing, spreadsheet and engineering graphics
3. Programming of engineering problems with C++.

Field : WATER ENGINEERING AND MANAGEMENT

Specialty :

INTEGRATED WATER RESOURCE MANAGEMENT

Field:	WATER ENGINEERING AND MANAGEMENT

Specialty:	Integrated Water Resource Management (IWM)

1. The objective of the training

Training of students in integrated water resource management will enable:

- A value for the necessity for water,
- The demand for sustainability of water,
- A need to participate in this resource management

2. Expected skills

→ **Generic skills**

- Master the basic computer tools;
- To develop a professional attitude in the respect of the deontology and the ethics;
- Work as a team in a training environment and in a professional practice environment;
- Understand how organizations work;
- Work in a multicultural environment;
- Create and manage a business;
- Use data collection and processing techniques;
- Implement research and job security actions;
- Develop a learning autonomy in order to continuously pursue personal and professional development throughout his career.
- Geography, geology, water engineering, national planning.

→ **Specific Skills**

- Water engineering
- Agro-industries
- Dam construction
- Water quality
- Hydro-power

3. Career opportunities

- Agriculture, Water and population management Ministries,
- Water management boards
- Hydro-electricity systems,
- Agro-industries

4. Organization of teachings

- **FIRST SEMESTER**

Field: **Water engineering and management**		Specialty: Integrated water resource Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
IWM111	Mathematics	40	20	10	5	75	5
IWM112	Physics	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
IWM113	Introduction to Water Resources Management	30	15	10	5	60	4
IWM114	Environmental Hydrology	30	15	10	5	60	4
IWM115	Groundwater Hydrology	40	20	10	5	75	5
IWM116	Catchment Processes and Watershed Management	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
IWM117	Bilingual Training	30	10	0	5	45	3
Total		**240**	**115**	**60**	**35**	**450**	**30**

- **SECOND SEMESTER**

Field: **Water engineering and management**		Specialty: Integrated water resource Management					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
IWM121	Principles of Integrated Water Management	40	15	15	5	75	5
IWM122	Economics of Water/	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
IWM123	Geochemistry of Natural Water, Pollution and Water Quality Monitoring	40	20	10	5	75	5
IWM124	Sustainable Water Development	30	15	10	5	60	4
IWM125	Geo-Information Systems in Water Resources Management	40	20	10	5	75	5
IWM126	Integrated Catchment modeling	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
IWM127	Computer and multimedia/Computer applications in Hydrology and Hydrogeology	30	10	0	5	45	3
Total		**240**	**110**	**65**	**35**	**450**	**30**

- **THIRD SEMESTER**

Field: **Water engineering and management**		Specialty: **Integrated water resource Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
IWM231	Environmental Chemistry	40	15	15	5	75	5
IWM232	Environmental Impact Assessment	35	10	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
IWM233	Wetlands Management	30	15	10	5	60	4
IWM234	Water and Irrigation	30	15	10	5	60	4
IWM235	Water sensitive urban design	40	20	10	5	75	5
IWM236	Water and Wastewater Treatment	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
IWM 237	Economy and Management of businesses / Civic education and Ethics/	30	10	0	5	45	3
Total		**245**	**105**	**65**	**35**	**450**	**30**

- **FOURTH SEMESTER**

Field: **Water engineering and management**		Specialty: **Integrated water resource Management**					
Course Code	**Course titles**	**Number of hours**					**Number Of Credits**
		L	**T**	**P**	**SPW**	**Total**	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
IWM241	Application of Geophysics in Groundwater exploration	40	15	15	5	75	5
IWM242	Water resources of Cameroun	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
IWM243	Water systems restoration	40	20	10	5	75	5
IWM244	Flood and Flood management	35	10	10	5	60	4
IWM245	Water Resources Planning and Evaluation,	30	5	5	5	45	3
IWM246	Professional Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
IWM247	Water Law, Policy and Legislation	30	10	0	5	45	3
Total		**205**	**75**	**110**	**60**	**450**	**30**

5. Courses content

❖ IWM 111: Mathematics

- **Mathematics : 4 credits (60 hours); L, T, SPW**

Objectives

At the end of this course, student will be able to apply mathematics understanding to agricultural production and business decisions.

1. **Basic arithmetic**
   - Decimals
   - Fraction
   - Percentage
   - Negative numbers
2. **Use of measures on the farm**
   - Linearmeasures
   - Square measure (area)
   - Cubic measure (volume)
   - Square roots
3. **Weights and their use**
4. **Trigonometric calculations**
5. **Measurement conversions**
6. **SI-units. Significant figures**

❖ IWM 112 : Physics

- **Physics : 4 credits (60 hours); L, T, P, SPW**

SI-units. Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young- interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle, continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity

❖ IWM 113: Introduction to Water Resources

- **Introduction to Water Resources management: 4 credits (60 hours); L, T, P, SPW**

Distribution of water on planet Earth, Hydrologic cycle, Renewable water resources, Time and space variability, Initial data and methodological approaches Continents, Natural-economic regions and countries, River basins, Inflow to the world Oceans. River runoff and underground water. Use of water resources, Principal water users and tendencies of their development, Assessing and forecasting global water use. Water availability and water resources deficit, Historical perspective of water and development, Anthropogenic changes in global climate and water resources. Ways of eliminating fresh water deficit in the world.

❖ IWM 114: Environmental Hydrology

- **Environmental Hydrology : 4 credits (60 hours); L, T, P, SPW**

Hydrologic processes, Methods for quantifying hydrologic parameters and processes. Soil water hydrology, Precipitation, Evapotranspiration, Infiltration Groundwater flow, Surface runoff, Soil erosion, Flow in channels, Forest and wetland hydrology, Remote sensing applications in hydrology, Modeling hydrologic systems, Environmental impacts related to Hydrological systems. Environmental impacts on water resources.

❖ IWM 115: Groundwater Hydrology

- **Groundwater Hydrology : 4 credits (60 hours); L, T, P, SPW**

Subsurface environment, Role of Groundwater in the hydrologic cycle, Water bearing properties of rocks and soils, Aquifer types: Principles of groundwater movement, Recharge, Groundwater development ,Groundwater withdrawal, Well hydraulics and Determination of aquifer parameters. Groundwater quality, Groundwater in coastal zones, Saline water intrusion, Hydrogeological mapping, Groundwater development in Cameroun.

❖ IWM 116: Catchment Processes and Watershed Management

- **Catchment Processes and Watershed Management : 4 credits (60 hours); L, T, P, SPW**

Introduction to watersheds, watershed functions, classifying, and evaluating watersheds, Ecology, geology, soils and geomorphology of water sheds, Basic Elements of watershed management, Soil and Vegetation management. Soil erosion/sediment control, Native species and reforestation, Data collection, Wetland monitoring, Meteorological monitoring, Hydrological monitoring, Damage assessment, Range management

❖ IWM 117: Bilingual training

➢ English : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulary**
   - Technical and usual vocabulary of the specialty
2. **Grammar**
3. **Bilingual expression**
   - Understanding in interaction in Technical Discussions
   - Continuous oral communication: Show, explain, develop, summarize, account, comment;
   - Interactions oral communication
4. **Autonomous reading of "writings" of all levels**
   - Lead by a quick reading to understand the general sense;
   - Browse a text long enough to locate desired information;
   - Gather information from different parts of the document or of the different documents in order to accomplish a specific task.
5. **Write clear, detailed texts**
   - Essay writing;
   - Application for employment;
   - C.V;
   - Letter of motivation;
   - Letter/memo writing and minutes of a meeting

➢ French : 1.5 credits (22 hours 30mn)); L, T, SPW

1. **Vocabulaire**
   - Vocabulaire du matériel de **technologie agro-alimentaire**
   - Vocabulaire des **produits agro-alimentaires**
   - Vocabulaire des **activités agro-alimentaires**
   - Vocabulaire des **actants**
   - Vocabulaire des **affaires**
2. **Grammaire**
   - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé, imparfait, futur, conditionnel, plus-que-parfait, l'impératif, l'infinitif, la voix passive ;
   - De l'adjectif : qualificatif, possessif, démonstratif, interrogatif, numéraux, indéfinis ;
   - Du nom et son article: masculin/féminin ; singulier/pluriel ; dénombrable et non-dénombrable ;
   - Du pronom : personnel, possessif, interrogatif, démonstratif, relatif, indéfini ;
   - De l'adverbe et de la locution adverbiale : pour dire comment, où, quand et pourquoi ;
   - Des fonctions grammaticales.

3. **Expression et communication**
   - Compréhension et interaction au cours d'une discussion technique ;
   - Communication orale courante ;
   - Communication orale interactive ;
   - De la phrase : simple, complexe, composée ; interrogative, déclarative, exclamative et impérative.
   - Lecture rapide et compréhension de texte ;
   - Synthèse de texte
   - De la communication : rédaction de texte, d'instructions, de rapport, d'une correspondance, d'une lettre recommandation ou de motivation, d'une demande d'emploi, d'une demande d'explication, d'une réponse à une demande d'explication, d'un CV ;
   - Gestion d'une table ronde/discussion : la prise de notes, la prise de parole
   - Expressions figées

❖ IWM 121: Principles of Integrated Water Management

➢ **Principles of Integrated Water Management: 5 credits (75 hours); L, T, P, SPW**

1. Presentation of the Principles
2. Stages of development
3. Current status
4. Applicability in Cameroon
5. Historical framework

❖ IWM 122: Economics of Water

➢ **Economics of Water: 4 credits (60 hours); L, T, P, SPW**

Worlds water supply and demand, Surpluses and deficits, Potential functions of water, Value of water, extractive values and in situ values, Valuation methods, Contingent Valuation Method(CVM), Hedonic Price Model (HPM), Travel Cost Method (TCM) , Production costs, Conservation and Protection, Conservation by pricing, Risk costs and value of reduction of contamination. Down stream impacts from up stream decisions.

❖ IWM 123: Geochemistry of Natural Water, Pollution and Water Quality Monitoring

➢ **Geochemistry of Natural Water, Pollution and Water Quality Monitoring : 5 credits (75 hours); L, T, P, SPW**

Geochemical cycle, Composition of rainwater, Surface water and groundwater, Equilibrium thermo dynamics, Activity-concentration relationships, Carbonate systems

and pH control , Silicate-water reactions , Weathering and water chemistry, Clay minerals and cation exchange, Adsorption, Organic compounds in natural waters, Radox conditions in natural waters, Quality of water, Water quality standards, Causes and concepts of pollution of water, Groundwater and Base Flow contamination, Mass transport, Transformation, retardation and attenuation of solutes, Inorganic chemicals and organic compounds in water, Urban and highway diffuse pollution, Industrial water pollution, Agricultural diffuse pollution, Water quality and health, Water quality monitoring as an information system: Sample collection, laboratory analysis, data handling, data analysis, reporting, and information utilization.

❖ IWM 124: Sustainable Water Development

- **Sustainable Water Development: 4 credits (60 hours); L, T, P, SPW**

1. Effective planning,
2. Efficient use/ Water quality
3. Maintaining a reserve base,
4. Physical sustainability
5. Economic sustainability;
6. National and international sustainability

❖ IWM 125: Geo-Information Systems in Water Resources Management

- **Geo-Information Systems in Water Resources Management : 5 credits (75 hours); L, T, P, SPW**

Introduction to remote sensing, Principles of remote sensing, Remote sensing systems, Digital image processing, Concepts of GIS, Spatial data: sources, acquisition and entry, Database, Vector and raster data, Data analysis, GIS output, Integration of remote sensing and GIS, Application of remote sensing and GIS in water resources modeling and management

❖ IWM 126 : Integrated Catchment Modeling

- **Integrated Catchment modeling : 4 credits (60 hours); L, T, P, SPW**

Catchment modeling techniques, Traditional and advanced approaches, Real-time flow forecasting, Mathematical modeling of integrated catchment responses in water flow, sediment and contaminant transport, Mathematical modeling for predicting impacts of future climate and land use changes. Parameterizing, Running and Validation of specific models, Limitations of catchment models.

❖ IWM 127: Computer and multimedia / Applications in Hydrology and Hydrogeology

- **Computer and Multimedia: 1 credits (15 hours); L, T, P, SPW**

Objective: Students preparation in computer programming and its applications in engineering.

Contents:

3. Introduction: Computer components, operating system, software & applications
4. Programming: Introduction, programming languages, flowchart, programming structure, introduction to C++, application of C++ to solve engineering problems, modeling and simulation.

Practicals:

4. Demonstration of computer components and Windows installation.
5. Exercise on the use of word processing, spreadsheet and engineering graphics
6. Programming of engineering problems with C++.

- **Computer Applications in Hydrology and Hydrogeology : 2 credits (30 hours); L, T, P, SPW**

  Two available computer packages one on hydrology and the other on hydrogeology will be will be selected based on students background and will be conducted as combined theory and laboratory practical assignment

❖ IWM 231: Environmental Chemistry

- **Environmental Chemistry: 5 credits (75 hours); L, T, P, SPW**

1. Air quality and air pollution
2. The ozone layer and CFCs (chlorofluorocarbons)
3. The chemistry of global warming
4. Energy and chemistry- focus on fossil fuels
5. Water quality and pollution
6. Acid rain
7. Nuclear fission and nuclear power plants
8. Alternate energy sources - solar, hydroelectric, wind, geothermal
9. Plastics and polymers
10. Agricultural chemistry
11. Nutrition and healthy living
12. Home environmental hazards
13. Land Pollution and Recycling
14. Toxic Heavy Metals, Wastes, Soils, and Sediments

❖ IWM 232: Environmental Impact Assessment

- **Environmental Impact Assessment : 4 credits (60 hours); L, T, P, SPW**

Objectives:
To understand principles, processes and techniques for assessment, mitigation and monitoring of projects.
Theory: Overview of environmental impact assessment, principles and purposes of IEE, EIA, SEA and its significance to the society; environmental impact indicators, baseline study; physical, biological and socioeconomic environment; main stages in EIA process, law, policy and institutional arrangements for EIA systems, selection of scientific and socio-economic factors in environmental impact assessment; identification of quantitative and qualitative environmental evaluation criteria; approaches for identifying, measuring, predicting, and mitigating environmental impacts Environmental management plan; environmental standards and EIA processes; public hearing steps and procedures; EIA methodologies for decision-making; guidelines for EIA, environmental evaluation of policies, EIA regulations of Cameroun

Practical: Review and critically analyze an environmental impact statement document; case studies of water management projects; post construction evaluation and mitigation measures; participation in public hearing meetings

❖ IWM 233: Wetlands Management

- **Wetlands Management: 4 credits (60 hours); L, T, P, SPW**

Definitions and classification of wetlands, Wetlands of the World. Wetland Environment, Wetland Hydrology. Wetland Ecosystems, Tidal Salt marshes, Tidal fresh water marshes, Mangrove swamps, Fresh water marshes, Peat lands, Riparian Ecosystems, Wetland Management, Wetland laws and protection.

❖ IWM 234: Water and Irrigation

- **Water and Irrigation : 5 credits (75 hours); L, T, P, SPW**

Soil-plant-water relations, Water requirement of crops, Cropping pattern, Irrigation of lowland rice and upland crops, Irrigation management: methods, conveyance, measurement and control, efficiency and sustainability, Droughts and alleviation strategies, Crop drainage: requirements, drainage coefficient, design considerations, Fertilizers and their management, Irrigation water quality requirements, Chemical pollution, Rainwater harvesting.

❖ IWM 235: Water sensitive urban design (WSUD)

- **Water sensitive urban design: 5 credits (75 hours); L, T, P, SPW**

1. Urban water Measures for Different Types and Scale of Development
2. WSUD Strategy for Development
3. Urban water Demand Reduction
4. Rainwater Tanks
5. Rain Gardens, Green Roofs and Infiltration Systems
6. Urban Water Harvesting and Reuse
7. Gross Pollutant Traps
8. Sedimentation Basins
9. Constructed Wetlands
10. Wastewater Management

❖ IWM 236: Water and Wastewater Treatment

- **Water and Wastewater Treatment : 4 credits (60 hours); L, T, P, SPW**

Physical, chemical and microbiological quality of water, Water quality management strategies. Fundamentals of chemical reactions. Chemical oxidation and reduction, Coagulation, Mixing, and Flocculation, Gravity Separation, Granular filtration, Membrane Filtration, Disinfection, Reverse osmosis. Ion exchange .Introduction to wastewater, Wastewater constituents, Wastewater characteristics, Wastewater treatment processes, Wastewater removal plants, Nutrient removal from waste water .Sludge handling and disposal, Industrial wastewater source control, Urban storm water Management.

❖ IWM 237: Economy and Management of businesses /Civic Education and Ethics

- **Economy and Management of businesses: 2 credits (30 hours); L, T, SPW**

1. The main administrative institutions, trade unions and professional
2. Operation of the local communities and development agencies
3. The activities of an enterprise in the economic and social context
4. Elements of Business Law and Social Law
5. Methods of organization
6. Needs analysis and determination of a strategy
7. Creativity Techniques
8. Economic Situation and growth
9. Functional organization of the company
10. Accounting of the company

11. Accounting conventions
12. The cash operations
13. Human Resources Management
14. Management of supply, of appropriations of third parties
15. Corporate communication
16. Management of administrative steps
17. Elements of business taxation
18. Financial analysis and investment
19. Budget management

- **Civic Education and Ethics: 1 credit (15 hours); L, T, SPW**

The Concepts

- The citizen;
- The Nation;
- The State;
- Public Property unto collective property;
- The freedoms;
- The public service;
- Problem of ethics;
- Ethics, Law and reason;
- Management and ethics of responsibility;
- Ethics and management.
- Ethics
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- Explain the importance of civics to the life of the nation
- Functions of the state and its citizens
- Deontology, Professional ethics and professionalism
- Relationship between morality, law and ethics
- Codes of ethics

❖ IWM 241: Application of Geophysics in Groundwater exploration

- **Application of Geophysics in Groundwater exploration: 5 credits (75 hours); L, T, P, SPW**

Subsurface geophysical parameters, Surface geophysical methods in groundwater exploration, principles and applications of Resistivity, Seismic, electromagnetic and gravity methods, Geophysical well logging techniques.

❖ IWM 242: Water resources of Cameroun

- **Water resources of Cameroun : credits (60 hours); L, T, P, SPW**

Cameroun and Global climatic Zones, Hydrometeorology of Cameroun, Climatic zones, Precipitation, Evaporation and Evapo-transpiration. Surface runoff and infiltration, Surface water resources of Cameroun, Major rivers and river basins, Groundwater resources of Cameroun, Main Hydrogeological units. Water quality and environmental impacts on water resources of Cameroun.

❖ IWM 243: Water systems restoration

- **Water systems restoration: 4 credits (60 hours); L, T, P, SPW**

1. The role of river systems
2. The role of river restoration
3. Framework for strategic water systems restoration
4. Process and procedures for river restoration
5. Costs, benefits and funding of river restoration
6. River health assessment
7. Prioritising restoration measures and project
8. Urban water management and restoration of urban rivers
9. Common measures for river restoration

❖ IWM 244: Floods and Flood management

- **Floods and Flood management : 4 credits (60 hours); L, T, P, SPW**

Floods as natural hazards, Causes, dynamics and consequences of river and coastal floods, Study of floods and their effects on landforms, Sediments, human works, and populations, Impacts and interpretations of flood hazard, Spatial characteristics and form of river floods and coastal floods, Common alluvial systems leading to flood plains. Flood estimation, Flood forecasting and warning. Policies and prospects.

❖ IWM 245: Water Resources Planning and Evaluation

- **Water Resources Planning and Evaluation : 4 credits (60 hours) L, T, P, SPW;**

Planning fundamentals and processes, Water resources systems, Sustainable development, Water sharing, sectoral demands and resource allocation, Management of water demand and use, Water conservation and augmentation, Multi-criteria analysis, plan under risk and uncertainty.

❖ IWM 246: Professional Internship

- **Professional Internship: 6 credits (90 hours); P, SPW**

1. Arrival and Integration
2. Working in a company
3. Choice of the theme of work in collaboration with the professional picture framer and the academic framer
4. Elaboration of method of research
5. Resources to be exploited
6. Organization of work
7. Drafting of the report
8. Presentation of the report before a jury

❖ IWM 247: Water Law, Policy and Legislation

- **Water Law, Policy and Legislation : 3 credits (45 hours); L, T, P, SPW**

Institutional aspects and people's participation. Water use and water market, Water and ethics, Water and poverty, Water and gender issues, Water conflicts and corporation, Water policies and procedures, Legal and Institutional requirements for water resource management, Water allocation laws, Environmental issues of water quality and quantity.

The Minister of Higher Education

Pr Jacques FAME NDONGO

TECHNICAL COMMITEE

President	:	**Pr Jacques FAME NDONGO,** Minister of Higher Education
Supervisor	:	**Pr NYONGBET GABSA Wilfried,** General Secretary of Ministry of Higher Education
General Coordinator	:	**Pr Richard Laurent OMGBA,** Head of Department of Higher Education Development (DDES)
Technical Coordinateur	:	**Mme NDJEBAKAL née ESSAMA ETOUNDI Marthe Florentine,** Head of unit for the Diversification of Training and Higher Education Programmes (CDOFPE)
Members	:	Dr NKOUE NDONDO Gustave Raoul, CEA1/ CDOFPE Mme BOUBA Odette, CEA2/ CDOFPE, Mme NDJOUM Adeline, cadre/CDOFPE Mme TSOUNGUI Françoise, cadre/CDOFPE Mme NJAPNDOUNKE NJOYA Hortense, cadre/CDOFPE Mme MBALLA MBATSOGO C, Cadre/CDOFPE M. NGASSAM Blaise, cadre/CDOFPE M. NAMA Benoît, cadre/CDOFPE
Proof Reading team	:	FONGOD Augustina, FONKENG EPAH, NGWANYAM Nicholas, DASCHACO John TAMBUTOH, NKAKA Christopher, AKOSO Wilfred NEBASSI , DJOKAM Dorothée, BETANGA Thaddus, EBANGA TANYI Maureen, ETOMES Sophie, NANYONGO MULEMA, Patience BAME, NWAGA Dieudonné, BELONG Philippe, NYOUM Benjamin, SILLA Jean Claude, NDUNG SHEHU AKWO, MBESSA Michel, NDOP Joseph, SAMBA Emelda NGUFOR, ONDOUA NGOUNDE, NDZANA Benoit, SUH AMBE Joseph, AFANA NGA Vincent, NASHIPU, KUGHONG Walters, NGEH MOHAMMED Lotan , AKIY Georges ALANG, KWALLO Martin, Romaric NGUEUTEU, MIH Thomas, AJAMAH Ferdinand, AFANE Charles, Andrew AKO AKO, EYONG Gloria ENEKE TAKEM, LUNGA Paul KEILAH,NDI Julius NSAMI,NWANA SAMA Bernard, MELLOH EBAKU Pius, FEDWO Nicodème, VOUFO Joseph, EDOA EYENGA Philomène, KUATE KAYO Joël, NKODO Armelle Carine Michelle, Theodore ABAH, FOE Claude Kelly, NGONG Innocent, ETOUNDI NDEMEZO'O François Yannick, OLEMBE Roland, NJANPA KOUMKAN Christian, SEPPI SAMOU Nathalie, BEYEME Christian, ABOUI Claire, FONKA Marie, ENGUENE Lazare, NKONDONGO Samuel, ZEH NANGA Nathalie, TUEGNO Marcel, NYANG EBODE Lydie, ONGOMO Pierre Claver, ONGUENE Antoine Guy, SAIDOU Hamann.
Digital Conception	:	DigiSOFT