

REPUBLIQUE DU CAMEROUN

MINISTERE DE L'ENSEIGNEMENT SUPERIEUR

REPUBLIC OF CAMEROON

MINISTRY OF HIGHER EDUCATION



CAMEROON HIGHER NATIONAL DIPLOMA TRAINING PROGRAM

Volume 2

SECONDARY SECTOR



September 2018



SECONDARY SECTOR



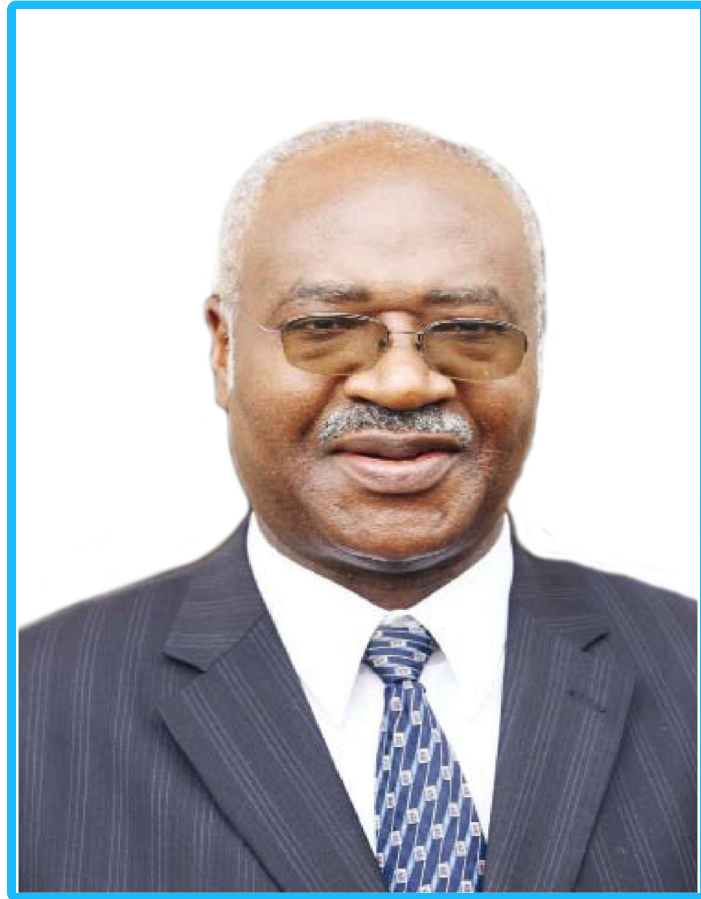
VOLUME 2



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 developed 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) ;

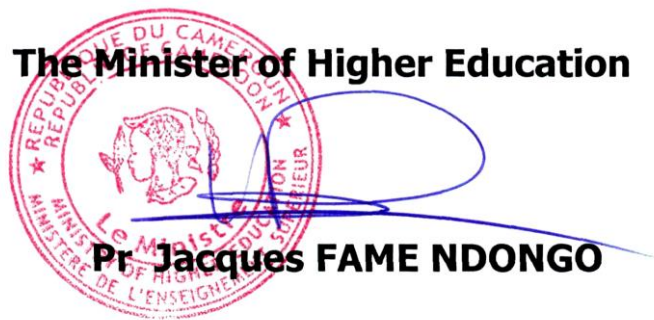
Volume 7 : Trainings of the Quaternary Sector (246 pages).

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.

The Minister of Higher Education



Order No. **18-00866** /MINESUP/SG/DDES OF **102 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:

SECTION I: 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.

Article 12: 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
Specialties**

- 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-Sustainability 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-Advertising and 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 specialties 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

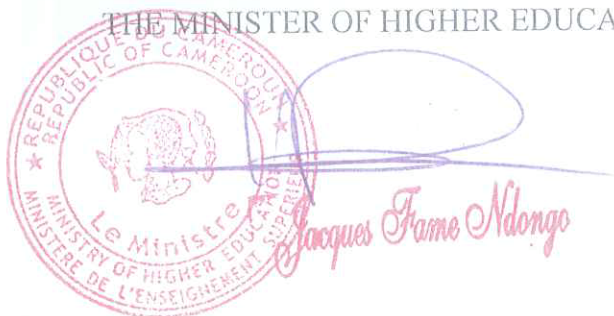
Article 29: This order repeals all prior contrary provisions including Order No. 01/0014/MINESUP/DDES of 26 February 2001 organising the system of studies and assessments and setting the syllabus for HND courses in the Republic of Cameroon, as well as those of Order No. 05/0020/MINESUP of 12 January 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,



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DOMAIN

ENGINEERING AND TECHNOLOGY

Field : CIVIL ENGINEERING

Specialty :

CIVIL ENGINEERING TECHNOLOGY

1. The objective of the training

The Higher National Diploma Programme in Civil Engineering Technology is aimed at producing technologists with a good mastery of engineering knowledge and skill in executing civil engineering works.

2. Expected skills

→ Generic Skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the real estate maintenance sectors;
- Maintain comprehensive records of work-in-progress for the parties concerned;
- Carry out engineering surveys;
- Carry out supervision and prepare progress reports on Civil Engineering works.

→ Specific Skills

- Design simple structural elements and prepare detailed drawings of such elements with minimum supervision;
- Carry out accurate interpretation of technical data related to Civil Engineering works;
- Test, analyse and interpret the result of materials tested for Civil Engineering works;
- Design simple transportation schemes and prepare working drawings for their construction;
- Supervise civil engineering construction works;

- Design simple water and waste water schemes and distribution networks;
- Prepare Bill of Engineering Measurements and Evaluation (BEME) and specifications for Civil Engineering works;
- Operate and maintain water works, waste water and solid waste installation and irrigation projects;
- Carry out environmental engineering and pollution control studies.

3. Career opportunities

- Site manager;
- Work leader;
- Drafting designer of public works structures;
- Price manager;
- In charge of general affairs

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Civil Engineering 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							
CET111	Mathematics I	30	20	15	10	75	5
CET112	Physics and chemistry I	20	15	15	10	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CET113	Engineering Survey / Soil Mechanics	35	20	10	10	75	5
CET114	Hydraulics / Concrete Technology	35	10	20	10	75	5
CET115	Theory of Structures	30	10	15	5	60	4
CET116	Civil Engineering Quantities & Specifications	20	10	20	10	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CET117	Bilingual Training	20	10	10	5	45	3
Total		190	95	105	60	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Civil Engineering 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							
CET121	Mathematics II	30	15	10	5	60	4
CET122	Computer Science I	40	15	10	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CET123	Hydrology And Hydrogeology	30	15	20	10	75	5
CET124	Design of Structural Elements	35	10	20	10	75	5
CET125	Construction Technology	30	15	10	5	60	4
CET126	Industrial Management/ Engineering materials			60		60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CET127	Creation of company, Civic and Moral Education	10	10	20	5	45	3
Total		170	75	160	45	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Civil Engineering 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							
CET 231	Mathematics III	30	15	10	5	60	4
CET 232	Physics and Chemistry II	30	15	20	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CET 233	Foundation Design / Hydraulic Structures	30	15	20	10	75	5
CET 234	Design ofStructural Steel & Timber	20	10	25	5	60	4
CET 235	Traffic Engineering / Highway Engineering	30	15	20	10	60	5
CET 236	Environmental Engineering and Pollution Control	20	10	20	10	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CET237	Methodology of drafting Internship report/LAW	20	10	10	5	45	3
Total		180	90	125	55	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Civil Engineering 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							
CET241	Statistics	30	15	20	10	75	5
CET242	Computer science II	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CET243	Geotechnical Engineering	30	15	20	10	75	5
CET244	Infrastructure Planning & Management	20	10	10	5	45	3
CET245	Irrigation and Drainage	30	10	15	5	60	4
CET246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CET247	Accounting and Economics	20	10	10	5	45	3
Total		160	75	145	70	450	30

5. Courses content

❖ CET 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ CET 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;
- Kinetics of solid bodies.

6. Fluid Mechanics

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. Nuclear Reactions

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. Pure body and mixtures

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. Chemical reactions

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);

- Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

➤ **Engineering Survey : 3 credits (45 hours); L, T, P, SPW**

Theoretical Content

1. **The principles of setting out compound and reverse curves**
 - Describe the characteristics of compound curves consisting of two or more circular curves
 - Explain the use of formulae to compute setting out data
 - Compute data needed to set out reverse curves
 - Set out reverse curve using 1.3 above
2. **The principles and methods of setting out transition curves**
 - Explain how transition curves are set out
 - Describe the geometrical characteristics of transition curves
 - Explain the use of formulae to compute setting out data
 - Set out composite curves i.e curves consisting of circular and transitional curves
 - Calculate change from the initial point to the end of a route consisting of various types of curves
3. **The principles of design and setting out of vertical curves.**
 - Explain the purposes of vertical curves
 - List the types of curves used
 - Identify the principal factors governing the length of vertical curves.
 - State the properties of the parabola as the curve normally adopted for vertical curves
 - Derive formulae for computing data for a vertical curve
 - Describe methods of setting out vertical curves
 - Describe a vertical curve and set out data giving length of the curve, gradients of the intersecting slopes and the reduced level of at least one known point
4. **The principles and methods of construction site surveys.**
 - Establish rectangular grid control for construction site surveys
 - Describe other forms of control suitable for construction site surveys.
 - Explain suitable self-checking setting out methods for large construction sites with many large structures
 - Set out specified levels from control levels
 - Establish a permanent survey control system on completion of the major construction
 - Explain how to overcome specific setting out problems due to impediments, destruction of control beacons, water obstacles, etc.
5. **The application of modern instrumentation and techniques in engineering surveys**

- Use modern survey instruments in setting out and surveying routes and structures
 - Carry out the application of photogrammetry in route selection, earthwork calculations, measurement of deformations of structures, as well as built surveys, etc.
 - Explain the uses and advantages of digital ground models in route surveys
 - Carry out some applications of micro-computers in engineering surveys e.g in curve design and setting out, computing setting out data for large structures, creation of digital terrain models etc.
6. **The methods of surveying underground installations**
- Explain the need for surveying underground installations
 - Describe the methods of locating underground installations, e.g by using detector instruments
 - Describe the method of surveying underground installations applying normal surface methods e.g traversing with radiation and offsets
7. **The principles of measurement of deformations and small movements with particular reference to monitoring the movements of dams**
- Explain the differences between deformations and small movements of structure
 - Explain why measurement of deformations should be carried out e.g monitor the deformation of dams
 - Describe methods to be adopted in establishing control for measurement of deformations
 - Describe survey methods for monitoring horizontal deformations.
 - Use precise levelling in measuring vertical deformations
 - Describe the application of photogrammetry in the measurement of deformations
8. **The principles and methods of engineering geodesy**
- Explain the scope of engineering geodesy (Precise engineering surveys)
 - Identify the distinguishing features of engineering geodesy - geodetic accuracy, precise centering, use of precise instruments
 - Specify the accuracy requirements of engineering geodesy and the instrumentation and observational procedures to achieve them
 - Describe special computational methods used in precise engineering surveys
 - Outline typical procedures for establishing microgeodetic control systems e.g for tunnel surveys, surveys of precise large structures (radio telescopes, particle accelerators, large ships, etc) and subsequent setting-out procedures

Practical Content

- Introduce the students to the Design of Horizontal and Vertical Surveys

- Establish permanent controls, use of photogrammetry and computers in engineering surveys

❖ CET 114 : Hydraulics/ Concrete Technology

➤ Hydraulics : 2 credits (30 hours); L, T, P, SPW

- 1. The forces on immersed object.**
 - Explain resultant thrust and centre of pressure on plane immersed surfaces
 - Determine the thrust and centre of pressure on curved immersed surfaces
- 2. The basic principles of dimensional analysis and hydraulic modeling**
 - Explain the concept of dimensional analysis
 - List the applications of dimensional analysis
 - Describe the procedure used in dimensional analysis
 - Solve problems using principles of dimensional analysis
 - Define similitude
 - Explain the uses of similitude
 - Explain geometric, kinematic, and dynamic similarity
 - Explain the application of the principles of geometric and kinematic similarity of Reynolds and Froudes Model Laws
 - Solve problems using the two model laws in above
- 3. The basic phenomena in non-uniform flow in channels**
 - Define specific energy
 - Define normal, sub-critical, supercritical and initial depth
 - Define hydraulic jump
 - Determine specific energy
 - Determine critical depth.
 - Determine hydraulic jump
 - Describe the characteristics of surface profiles
- 4. The uses and selection of pumps and turbines**
 - Identify different types of pumps
 - Determine the characteristics of pumps
 - Determine the uses of pumps
 - Identify different types of turbine
 - Determine the uses of turbines
 - Determine the characteristics of turbine e.g. cavitation, efficiency power
- 5. The determination of flows and heads of nodes**
 - Explain the friction formulae (Hazen-Williams and Darcy Weisbach)
 - Explain the uses of equivalent pipe

- Determine flow and heads in pipes in series and parallel
- Determine pipe flow and nodal heads using Hardy-Cross method
- Carry out practical exercise on each of the topics above under the supervision of a lecturer

Practical Content

General Objective: Conduct practicals to improve understanding of theoretical content.

➤ Concrete technology : 3 credits (45 hours); L, T, P, SPW

Theoretical Content :

1. Properties of Material

- Define cement
- State its uses
- State the constituents and types of cement
- State their physical properties e.g (fineness, specific surface, setting time, soundness, tensile strength, and compressive strength)
- Determine the above properties by tests
- Use the results to determine good concrete
- State the qualities of good aggregates (both fine and coarse aggregate) and water

2. Properties of Aggregate and Water Mixtures

- Grade coarse aggregate into standard diameter sizes
- Determine the relative density of coarse and fine aggregates
- Grade by sieve analysis - fine and coarse aggregates
- Combine aggregate to meet particular grading requirements
- Define light weight aggregates
- State properties of light weight aggregates
- Explain the uses of water in concreting
- Specify quality of water for bad and good concrete
- Illustrate the effects of bad water on the strength of concrete
- Determine moisture of fine and coarse aggregates
- Determine bulk densities of aggregates
- Determine fineness modulus
- Determine percentage bulking of moist sand
- Determine by experiment clay and silt content and other impurities in concrete
- State different types of concrete admixtures (accelerators, plasticizers, retarders, air entrains, colorants, waterproofers)
- State the compositions of the different additives and admixtures
- State their uses

- Select them for appropriate uses
3. **Concrete mixing.**
 - Define concrete
 - Explain the different mixing proportioning methods (by weight or by volume)
 - Describe thermal effects on design mixtures. The concept of prescribed and design mixture
 - State the influence of vacuums in fine and coarse aggregates of mixing design
 - Demonstrate the influence of voids on concrete using mixing experiments
 - State the purpose of mixing design
 - State the steps needed to get a good mixture
 4. **The importance of water/cement ratio in concrete mixing design**
 - Define water/cement ratio
 - Describe the influence of water/cement ratio on concrete strength
 - Draw graph to illustrate relationships between water/cement ratio and compressive strength. Illustrate by chart the relationship between age and concrete strength
 - Design concrete mixtures
 - Test concrete cubes of various water/cement ratio
 - Determine the relative density of wet concrete for various water/cement ratios
 - Determine water content for various slumps from tables
 - Determine an acceptable mixing specification and control procedure from the above results
 - Determine by experiment the effects of the following on concrete (cement to aggregate ratio, fine to coarse aggregate ratio, mixing time, degree of compaction method and age)
 5. **Statistical methods in mixing quality control**
 - State a statistical equation for mean and characteristic strength
 - Define target mean strength, characteristic strength, average strength, standard deviation, current margin, population and sample mean
 - Draw curve of normal probability distribution of concrete strength
 - State the criteria for acceptance or rejection of concrete
 6. **The importance of quality control in concrete works**
 - Define quality control in concrete practice
 - State the hazards of uncontrolled concrete mixture
 - State the implications of quality control vis-à-vis workability, batching, mixing, vibration, curing, checking and tests on all of the above
 - Describe types of mixtures
 - Select them for appropriate usage
 - State the purpose of curing concrete

- Describe the methods of curing concrete
 - Select the best method of curing concrete for different weather conditions, types of concrete and the additives used
 - Carry out tests on all of the above
7. **The strength of concrete**
- Define concrete cube strength
 - Determine cube strength by experiment
 - Determine cylinder strength, tensile strength, flexural, shear strength
 - Explain the effect of weather on the durability of concrete
 - Determine volumetric stability of concrete by testing for shrinkage, creep, moisture movement, temperature changes
 - Determine resistance of concrete to chemicals, water penetration and corrosion of reinforcement
8. **The uses of reinforced concrete**
- Describe heat insulation and sound insulation properties of concrete
 - State the reasons of reinforcement in concrete
 - Describe the various types of steel used as reinforcement in concrete
 - State the uses of each type of reinforcement (mild steel, high tensile, cold drawn, steel fabrics, etc)
 - State the required concrete cover for different conditions of use
 - Define pre-cast concrete
 - State the advantages and disadvantages of pre-cast concrete
 - Illustrate the handling and transportation of pre-cast elements prior to use
9. **The construction methods of pre-stressed concrete**
- Define pre-stressed concrete
 - Describe the various methods of pre-stressing concrete elements
 - Describe the safety precautions for handling the following: tendons, sheaths, tensioning apparatus, anchorages, ducts and grouting
 - Describe pre-tensioning and post-tensioning techniques in pre-stressed concrete
 - Carry out appropriate field trips

Practical Content:

General Objective: Conduct experiments to understand the properties of concrete

1. Determine Initial, and final setting time of Cement
2. Analyse fine and coarse aggregates and prepare grading curves and particular size distribution charts
3. Determine by experiment the relative densities of (a) fine and coarse aggregates (b) wet concrete with various water/cement ratio (c) prepare cubes and determine their compressive strength

4. Determine experimentally (a) bulk densities (b) percentage bulk densities of aggregates (c) percentage bulking of moist sand (d) clay and silt content of fine aggregates by silt test (e) specific gravity of aggregates (f) angularity (g) impact testing and hardness test on rocks (h) standard flakiness and elongation tests (i) aggregates crushing values (1/4, 2/16, 1/18)
5. Carry out (a) slump test (b) compaction tests (c) compressive, cube strength - flexural for cement mortar and concrete. Also, carry out nondestructive tests like ultrasonic, Schmidt rebound tests etc. BS 882 and BS 1881
6. Determine experimentally the workability of concrete mixture using (a) Vee-Bee consistometer apparatus (b) compacting factor (BS 1881)
7. Study the effects of the addition of sulphates on concrete mixture from different cement types

❖ CET 115 : Theory of Structures

➤ Theory of Structures : 4 credits (60 hours); L, T, P, SPW

1. Classical methods of solving indeterminate structures.

- Explain the principle of virtual work
- Compute deflection of simple beams and frames by virtual work principle
- Describe the following analytical methods (a) slopedeflection, (b) moment distribution (Hardy cross,) (c)conjugate beam (d) elastic load method. Draw shear force and Bending moment diagrams for indeterminate beams using the above methods
- Describe settlement of supports
- Draw final bending moment and shear force diagrams to illustrate the effect of settlement of supports
- Draw final bending moment and shear force diagrams for simple indeterminate portal frame structures
- Draw final bending moment and shear force diagram for indeterminate portal frames with sway

2. The application of influence lines in the analysis of determinate structure

- Explain the concept of influence lines
- Discuss the application of the concept to moving loads

3. The application of shear walls in buildings

- Define wall within the concept of a structural element
- Present types of walls, their specific functions and peculiar applications
- Present design philosophy of walls in relation to reinforced concrete concepts

- Discuss code specifications for shear walls and panels
- Enumerate cast-in-situ and pre-cast method of wall construction
- Visit any on-going construction site

❖ CET 115 : Civil Engineering Quantities & Specifications

➤ Civil Engineering Quantities and Specifications : 4 credits (60 hours); L, T, P, SPW

1. Measure construction works using SMM for building and Civil Engineering works for more complex and simple industrial building of over two stories

- Measure sub-structure of complex and special foundations, basements and piled foundations in variable ground.
- Measure floors - solid and suspended ground floors, suspended slab floors and associated reinforcement and formwork.
- Measure walls of brickwork, blockwork of solid cavity and hollow nature together with associated features.
- Measure doors and windows, associated frames and ironmongery including adjustments for openings.
- Measure roof construction and coverings of reinforced concrete roofs, steel trusses, tiles felt, asbestos, cement, corrugated sheets, lead, zinc, copper and aluminium.
- Measure frames of structural steel and reinforced concrete beams and columns, both when fixed by the main contractor or prime cost.
- Measure staircase-timber reinforced concrete including finishing.
- Measure fittings and fixture-cupboards, shelving, skirtings, picture architraves, picture-rails, pelmets, dadoes etc.
- Measure prefabricated structures: industrialized structures and building constructed mainly with standardized components off site.
- Measure wall cladding and external finishing: precast concrete and cost of both where supplied and fixed by the contractor and where the subject is of a prime cost.
- Measure internal finishing: ceiling, wall and floor finishing of a more complex nature, including demountable partitions and suspended ceilings, and curtain walling.

2. The measurement of drainage and utilities installations

- Measure drainage-excavations, pipe works, manholes, soakaway pits, septic tanks.
- Measure electrical installation.
- Measure water supply and sanitary appliances.
- Measure external works-paths, roads, flower and tree planting, turfing, fencing and gates.

- Identify the approach measurement of gas services, heating, ventilation and air-conditioning and other specialist services.
3. **The different methods of processing, dimensioning building and preparing schedule**
- Process dimensions, abstracting, cut and direct shuffle bill.
 - Explain different bill formats and their uses:
 - Prepare schedules for finishing, reinforcement opening (doors and windows), ironmongery, sanitary appliances and drains.
4. **The basic principles and scope of estimating**
- Explain techniques of approximate estimating by the use of the following methods.
 - storey enclosure
 - costing
 - superficial
 - lump or spot prices
 - Explain the elements of prime cost under
 - Define
 - prime
 - project overheads
 - general overheads
 - special risks and consideration
5. **Contractor's activities during the tender process**
- State the information obtained from the following sources:
 - bill of engineering measurement.
 - standard form of building contractor conditions.
 - drawings, list, schedules, and specifications.
 - Codes of practice relating to estimating.
 - Labour and plant performance data.
 - Manufacturer's and suppliers' specifications and quotations.
 - Subcontractors requirements and quotations.
 - Working rule agreement condition.
 - Liaison with parties generally.
 - Explain the purpose of pre-tender liaison meetings
 - Use information obtained in 5.1 for preliminary planning, statement of method, plant and equipment schedule, staffing requirements, including subcontractors, material supply, and cash flow.
6. **Measurement codes and measuring works in selected areas**
- Measuring works under Earth works - cutting and Embankments.
 - Measuring works under in situ and pre-cast concrete, including ancillaries in culverts, bridges, retaining walls, dams, etc.
 - Measuring works under roads and air-fields.

- Measuring works under piling and ancillary works.
- Measuring works in railway tracks.
- Measuring works in pipelines (for gas and water), sewers and drains.
- Measuring works in structural steel works and metal works.
- Measuring works in Timber.
- Measuring works in painting and water - proofing, fencing, tunneling, etc.
- Explain preamble and preliminary clauses in Civil Engineering works.
- Identify the importance of preamble and preliminary clauses.
- Write typical preamble clauses for different work sections in CESMM.
- Write typical preliminary descriptions for bill of engineering measurement items in accordance with CESMM.

7. Measurement of quantities in Civil Engineering Works in particular and BEME

- Measure earthwork, retaining walls, pile foundations, heavy foundations, pipelines, jetties sewers, tunnels, roads.
- Process quantities, editing and presenting Bills of Engineering measurement for Civil Engineering Works in particular.
- Explain method of related charges

8. Principles of specification writing

- Review the meaning of specification.
- Review types of specifications.
- Review the importance of specification.
- Discuss the basic requirements in writing a goodspecification.
- Explain the need for liaison in writingspecification.
- Explain the logical development of requirementsof items.
- Enumerate the use of drawings in writingengineering specifications.
- Explain the structure of a specification.
- Discuss the use of communication in specificationwriting.
- List the excluded items.
- Discuss the use of (i) historical and backgroundinformation, (ii) ancillary documents (iii) environmentalaspects.
- Discuss the importance of the following inspecification writing: (a) Scope of operation (b) Functional characteristics.
- Design specification.
- Write simple specifications for minor works.

❖ CET 117 : Bilingual training

➤ English: 1.5 credits (22 hours 30mn)

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
- How to introduce oneself

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;
- Lettre / memo writing and minutes of a meeting

➤ French : 1.5 credits (22 hours 30mn)

1. Vocabulaire

- Vocabulaire technique usuel

2. Grammaire

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ CET 121 : Mathematics II

➤ Mathematics II: 4 credits (60 hours); L, T, SPW

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

❖ CET 122 : Computer Science I

➤ Computer Science I : 5 credits (75 hours); L, T, P, SPW

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of the computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;

- Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
 4. **"Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
 5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
 6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ CET 123 : Hydrology and Hydrogeology

➤ **Hydrology and Hydrogeology : 5 credits (75 hours); L, T, P, SPW**

Theoretical Content

1. **Statistical methods in hydrology**
 - Explain the elements of probability
 - Illustrate the application of probability in hydrology.
 - Explain return period and its determination
 - Solve problems using probability
 - Determine:
 - Intensity - duration curve
 - Intensity - duration frequency curve.
 - Depth - area duration curve.
2. **The effect of infiltration on soils and ground water**
 - Define infiltration and infiltration indices.
 - Identify the factors affecting infiltration rate.
 - soil type
 - soil field capacity
 - Perform infiltration tests.
 - Apply infiltration factors to drainage design.

3. **The basic factors affecting surface run-off.**
 - Explain catchment area
 - Define surface run-off
 - State the factors affecting surface run-off
 - Identify the factors that affect duration of run-off
 - Determine run-off using the following methods
 - Rational method
 - Hydrographic method.
 - Explain the principles of a unit hydrograph
4. **The concept and importance of river gauging.**
 - Explain river gauging methods and instruments used.
 - Enumerate the merits and demerits of river gauging instruments.
 - Determine the discharge using common methods
 - use of floats
 - current meter
 - weirs.
5. **The basic principles of flood routing and hydrological forecasting.**
 - Define flood and flood routing.
 - Describe flood routing through reservoirs and channels.
 - Describe hydrological forecasting method.
 - Describe the synthetic flow data generation techniques.
 - Determine the hydro-meteorological estimation of extreme flood flows
6. **The basic principles of geophysical survey**
 - Define pure and applied Geophysics
 - Different methods of geophysical survey
 - Describe the various methods of geophysics applicable to ground water studies.
7. **The principles of ground water flow, aquifers and their characteristics**
 - Describe the occurrence of ground water
 - Describe the movement of groundwater (Darcy's Law)
 - Describe the methods of permeability measurements (Lab, and field methods)
 - Describe methods of abstraction of groundwater in relation to hydrology
 - Describe methods of estimation of well yield
 - Describe methods of bore hole drilling and development

Practical Content

Conduct Practicals to improve the understanding of Theoretical Content

1. Carry out measurement of rainfall using rain gauges
2. Determine infiltration capacity of soil
3. Determine permeability of soil

4. Carry out evaporation measurements
5. Produce drawings or representations of interpretation graphs for precipitation and computer rainfall values
6. Investigate the validity of Bernoulli's equation as applied to flow of water
7. Investigate Laminar and turbulent flow in a pipe with applications
8. Carry out geophysical survey analysis in an area of field layout
9. Measure flow in a stream or river nearby and compute river discharge

❖ CET 124 : Design of Structural Elements

➤ Design of Structural Elements : 5 credits (75 hours); L, T, P, SPW

Theoretical Content

1. **The limit state design philosophy**
 - Explain the philosophy of limit states and define the various limits.
 - State the appropriate safety factors used in the design of reinforced concrete elements
 - Design a singly reinforced rectangular section in bending.
 - Design a rectangular section with compression reinforcement at the ultimate state.
 - Design a flanged section in bending at the ultimate state.
 - Design a short column at the ultimate state.
 - Design a slender column at the ultimate state.
 - Design pad foundation.
 - Produce a structural layout of a typical floor and use it to carry out the design of the following elements:
 - a one way continuous slab
 - a continuous beam
 - an axially loaded short column
 - an axially loaded pad foundation
 - Detail (a) - (d) above
2. **Yield line theory.**
 - Explain the collapse mechanism and yield line.
 - Analyse 2-way reinforced concrete slabs using the yield line theory.
 - Design 2-way reinforced concrete slab.
3. **The limit state of serviceability.**
 - Explain the serviceability Limit States of fatigue, fire, impact, damage, (crack) and deflection
4. **The importance of torsion, shear and flexure in structures.**
 - Analyse for torsion, shear and flexural centres in structures.
 - Design for the above condition.
 - Design simple bolted, welded and friction connections

- Design bolted, welded and friction connections for plate girders and rigid joined frames
- Design for continuity at all joints and connections.

5. **Masonry structures**

- Design load bearing structures in brickwork, masonry, mass concrete e.g: retaining wall, dam, arches, tall chimneys, abutments and piers

Practical Content

General Objective: Know about site investigation

1. Design reinforced rectangular sections
2. Design columns
3. Design a 2-way reinforced concrete slab
4. Design steel joints
5. Design masonry structures in load bearing

❖ **CET 125 : Construction Technology**

➤ **Construction Technology : 4 credits (60 hours); L, T, P, SPW**

1. **Organization a site.**

- List the main items to be considered in the layout of a new construction site.
- Outline the principal factors which affect layout of materials, storage facilities and workshops on site.
- Explain the basis of the client-engineer-contractor relationship in Civil engineering contractors. List the principal duties of a resident engineer.
- Outline a recommended procedure for lifting heavy or bulk objects on site to minimize the risk of injury. Outline safety procedures on construction sites.

2. **The techniques, procedures and plants involved in large scale earth movement**

- List factors which influence the choice of earth moving equipment.
- Explain the operation of the following types of earth moving plants:
 - back-acting excavator
 - dragline
 - scraper
 - grader
 - bulldozer
- Explain procedures for site control of earthworks (in-situ moisture and density tests etc).
- Explain the use of top soil on site.
- Define borrow pit.
- Explain the use of imported back fill materials on site, outline the correct compaction procedure.

- Apply studies to estimate the plants required for a model earthwork.
- 3. **The principles and construction of formwork, trusses and flood.**
 - Describe by means of sketches how formwork is supported for:
 - a reinforced concrete column
 - a large reinforced concrete wall
 - a suspended beam
 - excavation in soft soil
 - Summarise the requirements of formwork.
 - Describe briefly the following types of formwork: timber; steel, plastic; pneumatic tubing, etc.
 - Write brief notes on the following:
 - release agents;
 - exposed aggregate;
 - knock-off finishing
 - striking of formwork.
 - Sketch a typical steel roof truss with welded connections illustrating methods of fixing the roof truss to a universal column stanchion.
 - Explain the principle of triangulation in relation to roof trusses.
 - Explain with the aid of sketches, a typical timber roof truss of short to medium span indicating methods of securing the members together.
 - Sketch details of forming openings and ducts in the following types of suspended floors:
 - Timber
 - solid reinforced concrete
 - precast concrete
 - hollow pot in-situ reinforced concrete.
 - Organise and visit sites.

❖ CET 126 : Industrial Management

➤ Industrial Management : 4 credits (60 hours); P

1. **Private and state control of enterprises**
 - Identify types of enterprises: sole proprietor, limited liability, co-operative societies, public corporation, and partnership.
 - Explain the objectives of a business organization.
 - Explain the business environment (e.g political, economic etc)
 - Examine private enterprises
 - Evaluate the public enterprise
 - Appraise the effect of private control of business.
 - Analyse the implications of state control of enterprises
2. **The methods of management**
 - Define management

- Explain the functions of management planning, organizing, controlling, staffing, directing.
- Explain the purpose of managing money, men, material and machines.
- Examine the concept of authority and responsibility.
- Appraise management by objectives.
- Analyse the roles of the Chief Executive and Board in policy formulation and implementation.
- Explain the motivation.
- Explain the concepts of Theory X and Y
- Evaluate management control
- Examine problems of leadership in organization.

3. **Elements of marketing**

- Define "marketing" and "market"
- State the marketing mix-product, price, place, promotion.
- Explain product differentiation.
- Explain market segmentation.
- Differentiate the industrial market from the consumer market.
- Define a product.
- Identify the stages of the product life cycle - introductory, growth, maturity, and decline.
- State the features of each stage in (3.7) above.
- Describe the different ways a company can develop a new product - e.g improving existing products, seeking new products from external sources, inventing a new product.
- Identify the different channels of distribution of a product.
- Choose the most appropriate channel of distribution for a given product.
- State the features of each channel in above.

4. **Personnel Development**

- Explain the concept of personnel management
- Define recruitment
- Explain the selection and engagement procedures.
- Appraise evaluation and merit rating.
- Explain the importance of education, training and development.
- Explain following: skill training, attitude training, technical training, and management training.
- Examine the relevance of industrial training to productivity in an organization.
- Examine critically different types of conditions of service.
- Define trade unionism, collective bargaining, joint consultation, conciliation, arbitration.

- Explain the roles of the Industrial Arbitration Panel, the Industrial Court and the
 - Ministry of Labour in maintaining industrial harmony in Nigeria.
 - Explain labour's share in the organisation's income.
5. **Quantitative Management Techniques**
- Identify types of management decisions
 - Explain the modern quantitative decisions techniques.
 - Appraise operation research.
 - Apply the use of decision trees, diagrams, programme evaluation review techniques (PERT), critical path model, etc... in operational research.
 - Examine the structure of linear programming problems.
 - Put in a chart some linear programming problems.
 - Examine the simplex method in solving linear programming problems.
6. **Maintenance schedules and replacement strategies**
- Explain purchasing
 - Analyse storage and stock ordering
 - Calculate the economic order quantity (EOQ)
 - State the importance of production in an organization
 - Evaluate production planning and control.
 - Appraise production scheduling
 - Explain quality control
 - Analyse replacement strategies
 - Define the following terms; preventive, corrective, breakdown, running and shutdown planning as used in maintenance
 - Critically examine maintenance culture in Cameroun
 - Estimate depreciation and scrap value.
7. **Money and the financial institutions**
- Define money
 - Explain the functions of money
 - Explain the functions of the Central Bank
 - Analyse the functions of a commercial bank.
 - Explain the functions of other financial institutions: the Merchant Bank, Mortgage Bank, Insurance Organisation, etc.
 - Enumerate types of insurance policy - e.g life policy, fire, marine, etc.
8. **Investment management**
9. **Data management**
10. **Understand the industry and national economy**
- State the importance of industry to human development.
 - List the factors necessary for the location of an industry.
 - Explain the main features of Cameroun's industrial policy.
 - Explain the different types of economic systems

- State the importance of the national income
- Examine the national economy.

❖ **CET 127 : Creation of Company and civic and moral education**

➤ **Creation of company:1 credit (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects ofacompany

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

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

❖ **CET 231 : Mathematics III**

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions

4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ CET 232 : Physics and Chemistry II

➤ Physics II: 4 credits (60 hours); L, T, P, SPW

1. Thermodynamics

- Temperature and thermal expansion;
- Heat and fundamental principle of thermodynamics;
- Change of state of ideal gases;
- Kinetic theory of heat;
- Cyclic process: second fundamental principle of thermodynamics;
- Change of state;
- The spread of heat.

2. Electrodynamics and applications

- Currents and fields;
- Production of magnetic fields;
- The phenomenon of induction;
- Alternating current;
- Electromagnetic waves.

➤ Chemistry: Basics of Quality, Health, Safety and Environment : 2 credits (30 hours); L, T, P

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement.

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;

- Implement a prevention plan or emergency plan in its area of intervention.
4. **Regulations and technical standards.**
- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
 - Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
 - Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
 - Apply ATEX regulations related to the control of risks related to explosive atmospheres;
 - Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ CET 233 : Foundation Design / Hydraulic structures

➤ Foundation Design : 2 credits (30 hours); L, T, P, SPW

1. **Pressure distributions below loaded foundations**
 - Illustrate pressure distribution by elastic theory (for point load) line load, triangular loading and strip loading.
 - Determine pressure distribution below loaded areas using
 - Boussinesq's equation, Newmark's Chart, Fadum's curves etc.
 - Describe the concept of pressure bulb.
 - Explain the importance of pressure bulb.
2. **Bearing capacity equations for shallow and deep foundation**
 - Differentiate between shallow and deep foundation.
 - Apply Terzaghi's theory to design shallow footings.
 - Apply Meyerhof's theory to design deep foundations.
 - Deduce bearing capacities from test results.
 - Calculate settlements of foundation from elastic and consolidation theories.
3. **Types of foundations and the basis of their choice.**
 - Describe the following types of foundation: strip, reinforced strip, pad, raft, pile, combined.
 - Explain the basis for their choice.
 - Design pad and combined footings for columns.
 - Design a raft foundation.
 - Organise and undertake field trips to a construction site.
4. **The structural design of retaining walls and abutments.**
 - Apply structural methods to design retaining walls and abutments.

- Compute earth pressure on abutments and wing walls.
- 5. **Earth pressures on sheet piles.**
 - Explain free earth support method for anchored sheet piles.
 - Explain fixed earth support method for anchored sheet piles.
 - Explain earth pressure of braced excavation.
 - Design sheet piles for different support conditions.
- 6. **The bearing capacity for piles in clays.**
 - Explain general classification of piles.
 - Explain the design of piles according to mode of load transmission (end bearing and friction).
 - Discuss pile groups (definition efficiency, spacing, pile cap).
 - Calculate bearing capacity for single piles.
 - Repeat 1.1 above for pile groups in clays, sands and layered systems.
 - Apply pile driving formulae for design.
 - State the limitations of pile driving formulae.
 - Design pile foundation for a bridge, tall buildings etc.
 - Design pile cap

Practical Content

1. Design pad and combined footings for columns.
2. Design raft foundation
3. Under-take a field trip to a construction site.
4. Design pile foundation for a brodge and fall building.
5. Design pile cap.

➤ Hydraulic Structures : 3 credits (45 hours); L, T, P, SPW

Theoretical Content

1. **The principles of design and operation of Hydraulic Structures**
 - Define Hydraulic Structures.
 - Identify the necessary design parameters, e.g. flood frequency, rainfall frequency, empirical formulae.
 - Explain sluices, flumes, stilling basins, culverts, aqueducts, siphons and hydraulic drops.
2. **The design principles of water intake structures.**
 - Define water intake
 - Describe the criteria for selection of an intake
 - Describe the principles of the followings:
 - Direct intake
 - Land intake
 - Reservoir intake.
 - Design of a simple intake structure

- Apply the design to describe the construction of a simple intake structure
- 3. **Water control works.**
 - Illustrate with drawings the followings: barrages, regulators, outlets, outfalls etc.
- 4. **The principles of Navigation Works**
 - Describe Navigation locks and Navigation channels.
 - Carry out practical exercises on each of the topic above.
- 5. **Types of Dam and Reservoirs.**
 - Explain the design criteria of different types of dams:
 - Describe various types of reservoirs
 - Carry out investigations for the location of dams and reservoirs
- 6. **The design principles of harbours, ports, jetties and wharf**
 - Explain the procedure for the design of harbors, ports, jetties and wharfs
 - Draw a typical harbor, port, jetty and wharf.
- 7. **The principles of Retaining Walls and its application to water retaining structures**
 - Describe the various types of retaining walls
 - Design simple retaining walls
 - Apply the design to describe the construction of retaining walls
 - Explain the codes of practice for design of water retaining structures
 - Design various types of simple water retaining structures,
 - Describe the construction of concrete and steel tanks
- 8. **River training works**
 - Explain the principles of groynes, spurs, bunds cut-offs, and revetments.
 - Explain the benefits of river training

❖ CET 234 : Design of Structural Steel and Timber

➤ Design of Structural Steel and Timber : 4 credits (60 hours); L, T, P, SPW

1. **The principles and criteria for safe design of structural steel work elements, connections, welded joints bolts, to BS 5950**
 - Design the following steel elements: simple floor beams, compound beams, or girders, plate girders, compound columns, latticed columns, roof trusses, bridge trusses, crane gantry, latticed girders for building continuous members in floor beams and columns, purlins, rails.
 - Design column caps; splice, brackets, bases of all types.
 - Design pinned connections.
 - Design connections for moments and torques.
 - Design for limits of web buckling and combined stresses.

- Carry out the design and detailing of a typical warehouse using BS 5950 or any current codes.
2. **The elements of composite construction involving concrete and steel to:**
 - Analyse composite beam for different neutral axis locations
 - Design composite beams for cased conditions
 - Design concrete/steel interface connection.
 - Design composite (concrete/steel) column/stanchion.
 3. **The principles of designing steel structures by plastic method.**
 - Explain the historical background of plastic theory.
 - Define collapse load.
 - Define mechanism
 - Describe conditions of collapse
 - Analyse simple beams and frames for plastic collapse situation.
 - Design the above for plastic collapse situation.
 - Use graphical methods to analyse design for plastic
 - Derive the work equation for a collapse mechanism
 - Compute structural capacity for various combinations of moment adjustments.
 - Carry out design and detailing on each of the above using these theories.
 4. **The application of design principles to various structures in timber**
 - Design timber roof trusses, lattice girder shorting, frame work, formwork for concrete placement.
 - Design connectors and connections for timber structures noting effects of shear, notching, bending and deflections.
 - Design timber built-up section and girders.
 - Carry out practical exercise on each of above

Practical Contents

General Objective: Undertake practicals to improve the understanding of theoretical content

1. Design structural steel elements
2. Design pinned connections.
3. Design a concrete/steel or composite, beam, column/stanchion.
4. Design simple beams and frames for plastic collapse situation
5. Design timber roof trusses, lattice girder, shorting, frame work, formwork for concrete placement.
6. Design timber built - up section and girders.

➤ **Traffic Engineering : 2 credits (30 hours); L, T, P, SPW**

1. **The flow of traffic as both a discrete or continuous process**
 - Explain the inter-relationship between people movement, transport technology and modes. Explain in quantitative terms (only) the flow of traffic as a continuous distribution.
 - Explain in qualitative terms (only) the flow of traffic as discrete distribution.
 - Compare the traffic stream and a fluid stream.
2. **The characteristics of a traffic flow that can be identified**
 - Define traffic headway in terms of space.
 - Define traffic in terms of time.
 - State the earlier knowledge on delays.
 - Explain the meaning of gap lapse acceptance, etc.
 - Define traffic stream, average speed, operating speed, density.
 - Record traffic flow and store the data
3. **The inter-relationship between the various flow parameters.**
 - Give the mathematical relationship between:
 - Headway, spacing and speed
 - Density and spacing
 - Volume, speed and spacing
 - Draw the fundamental traffic flow diagrams.
4. **The necessity of provision of terminals for transportation and the design of parking facilities**
 - Explain the meaning of terminals as applicable to Urban and Rural transportation network, i.e bus stops, garages etc.
 - State the necessity of same.
 - List the terminal facilities for each transportation mode.
 - Differentiate between laybys, bus-stops and end of journey terminals.
 - Enumerate the parking design criteria.
 - Obtain the parking demand for a scheme.
 - Obtain the parking demand for parking space provision.
 - Explain how to select the best parking scheme for a transportation mode.
 - Design parking facilities using space standard.
 - Apply the design to parking facilities.
5. **The working of traffic signals**
 - Define different types of traffic signals.
 - Describe the 8 warrants of traffic signals.
 - Explain the placing scheme of a traffic signal.
 - Give the different components of a cycle.

- Use Webster's formula to determine the cycle.
 - Design traffic signals.
6. **Capacity of a transportation facility at different levels of service and the factors that affect capacity and service Volumes**
- Define the capacities of highways, railways, airports and harbors.
 - Illustrate the application of spacing as a measurement of capacity.
 - Give the mathematical expressions for each of the above in terms of headways and schedules.
 - Explain the meaning of level of service for a transportation flow stream in terms of operating conditions.
 - Draw the speed-flow graphs.
 - Indicate different levels of service (A-E) on the above graph.
 - Explain the same and its application in traffic stream studies.
 - State the procedure for practical determination of levels of service.
 - Explain the relationship between capacity and service volumes.
 - State the roadway factors affecting capacity and service volumes.
 - Illustrate the roadway for traffic factors.
7. **Improvement of operation of a transportation scheme.**
- Show how traffic flow can be improved with traffic signals at intersections.
 - Study road markings and sketch them.
 - Apply adequate terminal facility provision.
 - Design operational controls.
 - Carry out practical exercises on each of the topics above.

➤ **Highway Engineering : 2 credits (30 hours); L, T, P, SPW**

1. **Highway routes.**
 - Define:
 - reconnaissance survey
 - location survey
 - preliminary survey
 - Explain setting out of roads
 - Describe final location survey
 - Use these surveys in Highway Engineering works
2. **Design visible elements of a highway.**
 - Design various components of a highway
 - Design typical highway components.
 - Undertake the design of a model Highway
3. **Pavement design data and methods.**
 - Explain CBR, its determination and applications (subgrades and borrow pits).
 - Illustrate bearing capacity, its determination and application.

- Explain various properties of bitumen.
 - Explain preparation and uses of asphalt.
 - Explain the design of flexible pavements.
 - Explain the design of rigid pavements.
 - Explain design of full asphalt pavements.
 - Design typical examples of 3.5, 3.6, and 3.7.
 - State the relative advantages and disadvantages of 3.5, 3.6, and 3.7 above.
 - Determine results of each stage of construction
4. **Alternative construction techniques in tackling complex situations**
- Explain the stabilization methods.
 - Describe the methods of construction on non-suitable sub-grades.
 - Undertake construction exercise on each topic above under the supervision of a lecturer.
5. **Various parts of different cross-sections of roads.**
- Illustrate different possible types of cross sections of highways (tangents, superelevation, embankment, excavation, culverts, bridges and tunnels).
 - Draw typical examples of 5.1 above.
 - State the drainage requirements of the various types of sections stressing their importance.
 - Explain different forms of drainages (longitudinal and cross sectional).
 - Explain the process of carrying out the construction of Road Cross sections.
6. **Different types of culverts.**
- Describe culverts as special types of drainages.
 - Distinguish the difference between culverts and bridges.
 - List the different types of culverts
 - Draw typical sections of culverts.
 - Explain the conditions under which the different types of culverts are used.
 - Carry out simple designs of typical culverts
7. **Different types of construction equipment.**
- Name different types of road construction equipment
 - Describe different types of road construction equipment.
 - Sketch different types of road construction equipment.
 - Explain the use of the different types of equipment for road construction.
 - State the basic methods of maintaining the above named equipment.
 - Manipulate/operate heavy building machines like bulldozer scrapper etc.
 - Explain the process of carrying out routine maintenance in machines.

Practical Content

General Objective: Acquire design knowledge and construction techniques in Highway Engineering

1. Carry out the location of possible routes of a roadway from contour maps
2. Review CBR tests on subgrade and embankment/fill materials
3. Design flexible pavements for different design parameters
4. Design rigid pavements for different design parameters
5. Design various forms of intersections and interchanges.
6. Draw typical examples of highway cross-sections and longitudinal sections
7. Design typical culverts from hydrology to structural considerations and details.

❖ CET 236 : Environmental Engineering and Pollution Control

➤ Environmental Engineering and Pollution Control : 4 credits (60 hours); L, T, P, SPW

1. **Concept of environment and environmental health**
 - Explain the concept of Environment
 - Explain the concept of Health
 - Explain the concept of Environment health
2. **Concepts of pollution and contamination**
 - Define pollution with examples
 - Define contamination with examples
3. **Different types of environment**
 - Give examples of different types of environmental air, water, soil, social, work etc.
4. **Different types of pollution and their effects**
 - Define air pollution, water pollution, land pollution, thermal pollution and noise pollution. Illustrate with appropriate examples
 - Identify the composition of the atmosphere
 - Explain:
 - Particulate matters
 - Sulphur dioxide
 - Oxides of nitrogen
 - Carbon monoxide
 - Hydrocarbons
 - Fluorine compound
 - Explain particulate fall-out
 - Describe air pollution indoors.
 - Describe the units of measurement of air pollutants.
 - Test for air pollution

5. Classification of water-related diseases

- Explain water-borne, water-based, water-washed and water related diseases
- Explain faecal-oral transmitted diseases.
- Explain the effects of water quantity and water quality on water related diseases.
- Differentiate between epidemics and endemic diseases.
- Explain the motive of WHO drinking water and sanitation laws.
- Describe the life cycle and methods of control of the following diseases
 - Schistosomiasis
 - Filariasis
 - Malaria
 - Common out nematodes
 - Diarrhoea diseases.
- Propose measures to curb the diseases in your area of operation

6. The basic principles of pollutants emission and disposal

- Explain the physical characteristics of the atmosphere
- Describe methods of pollution dispersion in the atmosphere.
- Explain how predicate the ground level concentration of pollution

7. The effects of specific environmental pollution and self-purification in water bodies

- Describe the effects of air pollution
- Propose measure to curb air pollution in the environment,
- Describe the various methods of air pollution control
- Define water pollution
- State the source of different type of water pollution (surface and groundwater)
- State the mechanism of self-purification of stream
- Test for water pollution.
- Produce results making future projections.
- List the effects of pollutants on receiving stream.
- List various control measures
- Apply these control measures in your state of operation.
- Define noise pollution
- List the sources of noise pollution.
- Determine (Measure) noise pollution in your area of operation.
- Describe the effects of pollution on human health.

8. Various methods of pollution control including vector control

- Define the vector control chemicals.
- Name the aquatic growth control
- Explain the effects of ventilation, artificial lighting illumination on human health.

- Describe the industrial hazards of working environment.
 - State the control of occupational health hazards.
 - Identify the sources of hazardous chemicals.
 - State the characteristics of hazardous chemicals from industries and agriculture.
 - Explain the effects of hazardous chemicals on water bodies.
 - Carry out test for hazardous chemicals.
 - Outline control measures.
 - Carry out practical exercise on each of the topic above
- 9. The management of solid wastes and their effects on the environment**
- Explain the environmental effects of solid waste management.
 - Identify the different methods of solid waste, waste collection treatment and disposal e.g., sanitary landfill, incineration.
 - Explain the general principles of sanitary land fill.
 - Explain the general principles of:
 - High temperature incineration.
 - Pulverization and bailing.
 - Describe the general principles of material recovery and conversion from solid wastes
 - Appreciate the effects of solid wastes management on the environment.
 - Design refuse disposal unit at your state of operation.
 - Undertake the construction of refuse disposal unit using the principles on 9.4 above.
- 10. The health effects of basic utilities and work environments.**
- The effects of ventilation, artificial lighting illumination on human health.
 - Describe the industrial hazards of working environment.
 - State the control of occupational health hazards.
- 11. The basic principles of environmental impact assessment**
- Define EIA and state the basic principles
 - Outline the basic steps in EIA
 - Explain environmental impact statements.
 - Explain environmental audits.
 - Discuss specific development projects vis-à-vis.
 - Prepare EIA, EIS for two different projects

Practical Content:

Conduct practicals to improve the understanding of theoretical content

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. General Approach

- Nature and contents of internship report;
- Paragraph;
- The style and spelling.

2. Structuring of the document

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. General information

- Remission of the probationary report;
- Choice of software.

2. Rules of presentation

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. Notes at the bottom of the page

4. Floaters

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. Bibliography

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;

- Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ **CET 241 : Statistics**

➤ **Statistics: 4 credits (60 hours); L, T, SPW**

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ **CET 242 : Computer Science II**

➤ **Computer Science II : 5credits (75 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.
 - Style of programming.
 - The management system of a company

➤ **Geotechnical Engineering : 5credits (75 hours); L, T, P, SPW**

1. Foundation repair process.

- Define the concept of foundation repairs
- Describe foundation underpinning using continuous strip footing.
- Describe foundation underpinning using pad footing.
- Describe foundation underpinning using pretest method.
- Describe foundation underpinning using injection (grouting) method
- Describe foundation underpinning using sheet piling.
- Describe foundation underpinning using freezing methods.
- Describe foundation underpinning by moving house.
- Describe foundation underpinning using other techniques

2. The principle of the use of caisson foundations.

- Define caisson foundation and list areas of use/application.
- List types and conditions for the use of caisson.
- Describe box and monolith caisson and discuss design procedure.
- Describe open caissons and discuss design procedure
- Describe pneumatic caisson and discuss the design procedure.
- Describe the risks associated with caissons and their remedies

3. Vibratory machine foundation.

- Define vibration of machinery foundation.
- Describe why conventional foundations do not suit vibrating machinery.
- Expose the principles of design of vibrating machinery foundation.
- Define foundation mountings. Explain the cork type mounting with limitations.
- Define the principles of the use of rubber carpet mountings (stand and rib types) with limitation.
- Define the principles of the use of the rubber bonded heavy duty mountings.
- Define leaf springs. State its limitation.

4. Complicated concepts of load combinations on strip, pad, combined pads, and raft foundations.

- Present the general principles of eccentric loadings on footings.
- Illustrate uniform, trapezoidal and triangular footing pressing distribution.
- Analyse footing with axial load and use it to define eccentric and total reaction on footing. Present the middle third loading principle
- Analyse footing with axial and horizontal loading.
- Analyse footing with axial load and applied moment.

- Analyse footing with axial and horizontal loading and applied moment.
- Present the generalized analysis applicable to all situations to take care of both positive and negative loadings and applied moments.

❖ CET 244 : Infrastructural Planning & Management

➤ Infrastructural Planning & Management : 3 credits (45 hours); L, T, P, SPW

1. The importance of water management of Resource Control

- Importance of planning and management for provision of infrastructural facilities.
- Identify the importance of infrastructural planning and management for provision of infrastructural facilities.
- Identify the importance of taking early steps towards effective infrastructural planning.
- Describe the steps in effective infrastructural planning and management

2. Factors affecting infrastructural facilities, system and structures.

- Identify the factors that are affecting infrastructural facilities, system and structures.
- Discuss involvement of community for project planning implementation, operation and management.
- Explain the effect of Climatic change on our infrastructural facilities, systems and structures.
- Explain the effect of environmental degradation on our infrastructural facilities, systems and structures

3. The planning and management of infrastructural provision

- Identify agencies in implementing planning and management of infrastructural provision.
- Explain Government responsibilities in planning and management of infrastructural provision.
- Discuss the Community responsibilities in planning and management of infrastructural provision.
- Explain private sector involvement in planning and management of infrastructure provisions.
- Explain household responsibilities in planning and management of infrastructure provision.
- Explain Local Government responsibility in planning and management of infrastructure.

4. Management plan for infrastructural facilities, systems and structures

- Describe the ways to gather information.
- Describe the steps to take in a comprehensive infrastructural facility survey.
- Explore and Evaluate management plan options.

- Explain the ways to conduct life cycle cost analysis and explore finance options.
 - Develop an infrastructural management plan.
 - Prepare a work schedule.
 - Discuss ways of informing beneficiaries about the management plan.
 - Demonstrate ways of implementing the infrastructural management plan.
 - Monitor the management plan.
5. **Performance management of infrastructural facility.**
- Explain performance management.
 - Identify the key processes fundamental to the success of the infrastructural facility.
 - Explain the measuring processes on the basis of feedback and performance information.
6. **Conduct Asset Management**
- Explain the role of infrastructural facility management.
 - Describe how to prepare an Asset Management Register, Cataloguing for each asset.
 - Prepare an Asset Management Plan.
7. **Maintenance Programme**
- Identify various maintenance programmes for infrastructural facilities, system and structures.
 - Describe the various maintenance programmes of infrastructural facilities, systems and structures.
 - Discuss maintenance self-audit
 - Prepare maintenance self-audit
 - Prepare maintenance programmes for facilities, systems and structures
8. **The application of GIS and Information Management packages to Infrastructural facilities, systems, and structures**
- Identify data needs for information management for infrastructural facilities and systems.
 - Discuss the application of GIS as a means to capture, process, distribute and manage information on infrastructural facilities, system and structures.
 - Explain the application of GIS and other information techniques as a means for developing statistically based management reports.
 - Apply GIS and other information techniques to develop infrastructural planning and management.
 - Apply other management packages for infrastructural management

❖ CET 245 : Irrigation and drainage

➤ Irrigation and drainage : 4 credits (60 hours); L, T, P, SPW

Theoretical Content

1. **Interrelationship of soil, water and plants**
 - Define crop water requirements.
 - Determine irrigation requirements.
 - Determine adequacy of water sources.
 - Test the soil-plant-water level for irrigation.
 - Describe soil salinity ratios
2. **The planning procedure and irrigation methods**
 - Establish the need for irrigation programme.
 - Determine the characteristics of the area to be irrigated.
 - Propose uses of an irrigated area.
 - Plan a layout programme for irrigation.
 - Analyse each of their economic importance.
 - Identify the criteria that affect choice of irrigation method.
 - Choose an appropriate irrigation method for specific programme.
 - Define appropriate method for specific conditions.
 - Carry out case studies of a given area for irrigation project.
3. **Drainage and Land reclamation as integral part of Irrigation programmes**
 - State the functions of drainage.
 - Distinguish among the various types of drainage.
 - Choose appropriate type of drainage.
 - Plan reclamation programme.
 - Design efficient drainage work for specific condition.
 - Determine how effective the land reclamation is.
 - Carry out case studies of a given area.
4. **Management Techniques in Irrigation**
 - State the factors affecting efficiency in operation of irrigation schemes.
 - State the importance of irrigation maintenance services.
 - Explain the engineering measures necessary for the control of health hazards in irrigation programmes.
 - Apply management techniques on irrigation works.

Practical Content

General Objective: Conduct practicals to improve the understanding of theoretical content

1. Measure Irrigation flow at head works
2. Measure lateral canal flow value
3. Determine volume of irrigation water
4. Estimate drainage channel discharge

5. Draw field layout and grading of land for irrigation project
6. Carry out tests on soil plant water level.
7. Sketch drainage layout for land readmission programme, including cross-section of channels
8. Carry out case studies of irrigation and land reclamation projects
9. Carry out site visits

❖ CET 246 : Professional internship

➤ Professional internship I: 6 credits (90 hours); P, SPW

1. Arrival and integration in the enterprise
2. Working in an enterprise
3. Holding of the Internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
5. Elaboration of the research outline
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ CET 247 : Accounting and Economics

➤ Accounting: 1 credit (15 hours); L, T, SPW

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.

5. The depreciation and amortization

- Definition;
- Accounting registration;
- Typology.

B. General introduction to the Financial Analysis

1. Analysis of the balance sheet

- Summary presentation of the balance sheet.

2. Study of the structure of the balance sheet

- Calculations of ratios.

3. Functional analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

4. Differential analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. Generality on the cage

- Objective;
- Role;
- Concept of burden.

2. Analysis of expenses

- Liable burden
- Direct and indirect expenses;
- Valorization of stocks.

3. Method of full costs

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. Notions of general economics

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;
- The prices;

- The concept of growth and development.
- 2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
- 3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
- 4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
- 5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
- 6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

Field : CIVIL ENGINEERING

Specialty :
TOPOGRAPHY

1. The objective of the training

This specialty has as objective to train experts in metric readings on the field with the aim to develop plans and maps. The senior technician implements different measuring, positioning, data entry and implantation devices. He treats the data collected using appropriate technical means. His permanent concern to produce quality work requires a rigorous control with respect to safety rules.

2. Expected skills

→ General skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the topography sectors.

→ Specific skills

- Process the data collected using appropriate means of calculation, CAO and CAD;
- Operate the technical documents and legal information in preparing and organizing the information collected.

3. Career opportunities

- Land Surveyor topographer;
- Draftsman;
- Surveyor;
- Chief of Brigade;
- Person in charge of studies

4. Organization of teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Topography					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
TOP111	Mathematics I	30	25	0	5	60	4
TOP112	Physics and Chemistry I	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
TOP113	Topometry I	30	20	20	5	75	5
TOP114	Technical drawing and Cartography I	30	25	0	5	60	4
TOP115	Geographical System I	35	20	0	5	60	4
TOP116	EngineeringGeology /Topology	35	25	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
TOP113	Topometry I	30	20	20	5	75	5
Total		210	160	45	35	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Topography					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
TOP121	Mathematics II	30	25	0	5	60	4
TOP122	Computer science I	30	20	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
TOP123	Geographical System II	35	20	0	5	60	4
TOP124	Technical drawing and cartography II	20	30	20	5	75	5
TOP125	Land tenure and estates	35	15	5	5	60	4
TOP126	Topometricalcalculations II and Topometrical Technology II	25	25	20	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
TOP127	Company creation, Civic and Moral Education	25	10	5	5	45	3
Total		200	145	70	35	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Topography					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
TOP231	Mathematics III	30	25	0	5	60	4
TOP232	Physics and Chemistry II	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
TOP233	Geographical System III and Remote Sensing	35	15	5	5	60	4
TOP234	Topometrical calculations III	30	15	10	5	60	4
TOP235	TopometricalTechnology III	15	15	25	5	60	4
TOP236	Urban planning and Computer Assisted Drawing	35	20	30	5	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
TOP237	Methodology of drafting internship report, Law	27	15	0	3	45	3
Total		207	125	85	33	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Topography					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
TOP241	Statistics	30	25	0	5	60	4
TOP242	Computer Science II	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
TOP243	Topometry IV	20	25	10	5	60	4
TOP244	Geodesy and Remote Sensing	35	15	20	5	75	5
TOP245	Highways and miscellaneous networks	28	0	15	2	45	3
TOP246	Professional internship	0	0	90	0	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
TOP247	Accounting and Economics	27	15	0	3	45	3
Total		160	90	175	25	450	30

5. Course contents

❖ TOP 111 : Mathematics I

➤ Mathematics I: 4 credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic function 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

❖ TOP 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. Kinematics

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. Action of forces on a material point

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. Gravitation

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. Work, power, energy and momentum

- Work;
- Power;

- Energie;
- Momentum

5. Action of the forces on a solid body

- Statics;
- Kinetics of solid bodies.

6. Fluid Mechanics

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. Nuclear Reactions

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. Pure body and mixtures

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;

- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. Chemical reactions

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);
- Molecular model of Lewis;
- Establish an equation of reaction;
- Establish a molar balance sheet;
- Standard enthalpy of reaction;
- Exothermic and endothermic reactions;
- Chemical equilibrium of reaction: Equilibrium constant;

4. Speed of chemical reaction

- Set the speed of a reaction by report to a reagent or product ;
- Define the constant speed;
- Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
- Define the Time of half-reaction;
- Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
- Explain the role of a catalyst;
- Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.

5. Reaction in aqueous solution; Acidic, basic and oxido-reduction

- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
- Oxidation, reduction, torque acido-basic, redox couple;
- Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
- Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;

- Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
- The reactions acido-basic;
- Redox reactions.

6. Organic chemistry

- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cycloalkanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
- Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
- Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
- Distinguish monomer and polymer;
- To distinguish the types of reactions of polymerization;
- Describe the properties of a few industrial polymers.

❖ TOP 113 : Topometry I

➤ Topometric calculation I: 3 credits (45 hours); L, T, P, SPW

1. Bases for the calculation of surveying
2. The resolution of the triangles
3. Coordinates of a point

➤ Topometric technology I : 3 credits (45 hours); L, T, P, SPW

1. The Topography
2. General information on the establishment of plans and maps
3. Concept on the theory of errors

❖ TOP 114 : Technical drawing and cartography I

➤ Technical drawing I: 2 credits (30 hours); L, T, SPW

1. General information
2. The different types of plan
3. The Topographical plotting
4. Establishment of a topographical plan to the scale 1/100

➤ Cartography I: 2 credits (30 hours); L, T, SPW

1. A few definitions
2. The notion of scale

3. The concept of cartography and map
4. The scientific and technical parameters of a map

❖ **TOP 115 : Geographical System I**

➤ **GPS I: 2 credits (30 hours); L, T, SPW**

1. Introduction
2. Definition and history of GPS
3. History and geodetic positioning

➤ **Photogrammetry I: 2 credits (30 hours); L, T, P, SPW**

1. General information on photogrammetry
2. The aerial photography
3. The stereoscopy

❖ **TOP 116 : Engineering geology / Topology**

➤ **Engineering geology / Topology: 4 credits (60 hours); L, T, SPW**

1. The internal and external structure of the earth
2. The types of rock
3. The forms of reliefs
4. The movements of the earth crust
5. The consequences of the movements of the earth crust
6. The process of formation of rocks
7. The weathering of rocks
8. The sedimentary basins

❖ **TOP 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
- How to introduce oneself

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;
- Lettre / memo writing and minutes of a meeting

➤ French : 1.5 credits (22 hours 30mn)

1. Vocabulaire

- Vocabulaire technique usuel

2. Grammaire

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;

- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ TOP 121 : Mathematics II

➤ Mathematics II: 4 credits (60 hours); L, T, SPW

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar fields and vectors and a few applications

❖ TOP 122 : Computer Science I

➤ Computer Science I: 5 credits (75hours); L, T, P , SPW

1. **General information and vocabulary**
 - Concept of information and computer Science;
 - Computer problems solving;
 - Computer typology and configuration;
 - Fields of application of the computer;
2. **Representation and processing of the information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculations circuits& memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);

- Architecture and performance of microprocessors;
 - Schedule a micro-computer (binary and hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
- 4. Border" machine (Hardware) - Man (Software)" as solutions to problems**
- The BIOS;
 - The application systems;
 - The application programs.
- 5. Operating the machine and examples of operating system**
- WINDOWS (DOS);
 - Linux: an interesting alternative.
- 6. A few examples of application software**
- The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ TOP 123 : Geographical System II

➤ GPS II: 2 credits (30 hours); L, T, SPW

1. What is the use of the GPS?
2. Components of the GPS system
3. General information
4. Concepts on HSE/ HSQ

➤ Photogrammetry II: 2 credits (30 hours); L, T, SPW

1. Exploitation of aerial photographs
2. The stereophotogrammetry
3. The restitution

❖ TOP 124 : Technical drawing and cartography II

➤ Technical drawing II: 2 credits (30 hours); L, T, P, SPW

1. The divisions of surface areas
2. Tachymetrical transfer
3. Transfer of the work carried out during the sessions of practical
4. Carry-over of the project at the end of studies.

➤ Cartography II: 2 credits (30 hours); L, T, P, SPW

1. Reading, use of a thematic map
2. The map tracer
3. The pantograph

❖ TOP 125 : Land tenure and estate system

➤ Land tenure and estate system : 3 credits (45 hours); L, T, SPW

1. Classification and definition of the various administrative texts
2. Ownership
3. Easement and the land service
4. Expropriation for reasons of public utility
5. The different areas
6. The procedures for obtaining a land title
7. Demarcation
8. Parcelling out
9. The professional responsibilities of the surveyor

❖ TOP 126 : Topometric calculations II and topometric Technology II

➤ Topometric calculations II: 4 credits (60 hours); L, T, P, SPW

1. General information on the planimetric canvas
2. The position finding pathways
3. The declined method pathways.

➤ Topometric Technology II: 3 credits (45 hours); L, T, P, SPW

1. Different operations of levelling
2. Classification of different kinds of levelling in function of their precision
3. Mistakes and systematic errors.

❖ TOP 127 : Entrepreneurship and civic and moral education

➤ Entrepreneurship: 1 credit (15 hours); L, T, SPW

1. Concept of an entrepreneur
2. Motivations in the creation of a business
3. Search for ideas and evaluation
4. Search for funding
5. Choice of legal status
6. Ethical aspects of business

➤ Civic and moral education: 2 credits (30 hours); L, T, SPW

The Concepts

- The citizen;
- The Nation;

- The State;
- Publics Property unto collective's goods;
- 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

❖ TOP 231 : Mathematics III

➤ Mathematics III: 4 credits(60 hours); L, T

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean vector space
5. Linear applications
6. Matrices

❖ TOP 232 : Physics and Chemistry II

➤ Physics III: 2 credits (30 hours); L, T, P

1. Thermodynamics

- Temperature and thermal expansion;
- Heat and fundamental principle of thermodynamics;
- Change of state of ideal gases;

- Kinetic theory of heat;
- Cyclic process: second fundamental principle of thermodynamics;
- Change of state;
- Spread of heat.

2. Electrodynamics and applications

- Currents and fields;
- Production of magnetic fields;
- The phenomenon of induction;
- Alternating current;
- Electromagnetic waves.

➤ Chemistry: Basics of Quality, Health, Safety and Environment 2 credits (30 h); L, T, P, SPW)

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;
- Implement a prevention plan or emergency plan in its area of intervention.

4. Regulations and technical standards.

- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
- Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;

- Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
- Apply ATEX regulations related to the control of risks related to explosive atmospheres;
- Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **TOP 233 : Geographical System III and Remote Sensing**

➤ **Geographical Information System: 2 credits (30 hours); L, T, P, SPW**

1. The geographical data (natures, acquisition, representation)
2. Analysis of a GIS
3. Methodology and establishment of a GIS project.

➤ **Remote sensing : 2 credits (30 hours); L, T, SPW**

4. Introduction to remote sensing
5. The sensors
6. The hyper frequencies

❖ **TOP 234 : Topometric calculations III**

➤ **Topometric calculations III: 4 credits (60 hours); L, T, P, SPW**

1. Calculation of the surface area
2. Calculation of the precision of a surface, rounding up of surface area
3. Attachments

❖ **TOP 235 : Topometric technology III**

➤ **Topometric technology III: 4 credits (60 hours); L, T, P, SPW**

1. Master the operation of theodolites, tachymeters, levels, and distance meters.
2. Indirect measurement of distances and instrumental variations
3. The trigonometric indirect levelling

❖ **TOP 236 : Urban planning and computer-assisted drawing I**

➤ **Urban development: 3 credits (45 hours); L, T, SPW**

1. General information
2. The documents of town planning
3. The general structures of a city

4. Function of the city
5. Parcelling out
6. The analysis of a natural site
7. Masterpiece town plan and details

➤ **Computer Assisted Drawing: 3 credits (45 hours); L, P, SPW**

1. Production of a seedling of numbered and rated points
2. Codification and tracing
3. Plotting of curves of level
4. Automatic drawing of profiles
5. Dressing and presentation

❖ **TOP 237 : Initiation to the Law and Methodology of drafting internship report**

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

➤ **Methodology of writing an internship report: 1.5 credits (22 hours 30 min); L, T, SPW**

A. Drafting and structuring of probation report

1. General Approach

- Nature and contents of internship report;
- Paragraph;
- The style and spelling.

2. Structuring of the document

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;

- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. General information

- Remission of the probationary report;
- Choice of software.

2. Rules of presentation

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. Notes at the bottom of the page

4. Floaters

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. Bibliography

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

❖ TOP 241 : Statistics

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

1. Descriptive statistics in a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis test of KHI-two

❖ TOP 242 : Computer Science II

➤ Computer Science II: 5credits (75 hours); L, T, P, SPW

1. Introduction
2. Fundamental elements

- Problem and the algorithm;
- Program and programming language;
- From problem to the solution by computer;
- Programming paradigms.

3. Concepts of programming in C++

- Presentation and description of the programming language;
- Structuring of a program;
- Descriptions of the data, actions;
- Style of programming.

❖ TOP 243 : Topometry IV

➤ Topometric calculations IV: 3 credits (45 hours); L, T, P, SPW

1. The intersections
2. Increases
3. Overlap

➤ Topometric technology IV: 2 credits (30 hours); L, T, SPW

1. Indirect geodetic levelling
2. Concepts of regrouping
3. General organization of a survey; classification of different surveys and plans

❖ TOP 244 : Geodesy and remote sensing

➤ Remote Sensing II: 2 credits (30 hours); L, T, P, SPW

1. Analysis of images
2. Applications

➤ Geodesy: 3 credits (45 hours); L, T, SPW

1. Definition, purpose, history of geodesy
2. General information
3. The projections
4. The reference systems
5. Three-dimensional geodesy by satellite
6. The classical geodetic canvas
7. Observations and calculations
8. Concept of astronomy (celestial sphere- coordinates and stars, triangle of position etc...)

❖ **TOP 245 : Highway systems and various networks (HHT)**

➤ **Highway systems and various networks (HHT): 3 credits (45 hours); L, P, SPW**

1. Highways
2. Sanitation networks
3. Water distribution networks
4. Energy networks
5. Telephone networks
6. Irrigation and watering networks in rural areas.
7. The networks of sanitation and drainage in the natural environment
8. Coordination of networks

❖ **TOP 246 : Professional internship**

➤ **professional internship I: 6 credits (90 hours); P, PW**

1. Arrival and integration in the enterprise
2. Working in a company
3. Holding of the Internship journal
4. Choice of the theme of work in collaboration with the professional trainer and the academic supervisor
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

❖ **TOP 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;

- Accounting registration;
- System of inventory;
- Stock form.

4. The regulations on term: the effects of trade

- Definition;
- Principles;
- Calculations.

5. The depreciation and amortization

- Definition;
- Accounting registration;
- Typology.

B. General introduction to the Financial Analysis

1. Analysis of the balance sheet

- Summary presentation of the balance sheet.

2. Study of the structure of the balance sheet

- Calculations of ratios.

3. Functional analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

4. Differential analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. Generality on the cage

- Objective;
- Role;
- Concept of burden.

2. Analysis of expenses

- Liabile burden
- Direct and indirect expenses;
- Valorization of stocks.

3. Method of full costs

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ **Economics: 2 credits (30 hours); L, T, SPW**

1. Notions of general economics

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;
- The prices;
- The concept of growth and development.

2. The Company

- Introduction;
- Typology of enterprises;
- Structure and organization of the enterprise;
- The company and ethics;
- How to undertake (create, decide, manage).

3. The place of the company in the economic fabric

- Concept of the environment of the company;
- The inter- and extra-enterprises relationships;
- The commercial activity;
- The notion of strategy.

4. The productive activity

- The policies and processes of production;
- The trade policies;
- Logistics.

5. The concept of management in the company

- The activity and financial resources;
- The planning and management of human resources;
- The planning and the management of material resources.

6. Information and Communication in the Enterprise

- Role of information and communication;
- Collection and organization of information;
- Strategic diagnosis;
- Decision System

Field : CIVIL ENGINEERING

Specialty :

URBAN PLANNING

1. The objective of the training

This specialty leads to the training of professionals able to design and lead coherent actions in the areas of habitat, equipment, public spaces and communal or inter-municipal development, in consultation with the local communities in which is the council.

2. Expected skills

→ 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

- Mastering the parameters of studies and the conduct of the work of urban development in the design office and on site;
- Develop a high sense of foresight and synthesis;
- Control of the demographic evolution in view of the accuracy of the infrastructure and equipment in urban environment;
- Educate and train in the resolution of the problems of the degradation of the environment;

- Exploit the data of a site and produce the technical documents with a view to the achievement of a development project;
- Control the feasibility of a project of urban development.

3. Career opportunities

- Head of construction site;
- Works leader;
- Draftsman of public works structures;
- In charge of general business of public Works structures.

4. Organization of teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Urban Planning					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
URP111	Mathematics I	30	25	0	5	60	4
URP112	Physics and Chemistry I	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
URP113	Town planning and town planning regulations	40	10	5	5	60	4
URP114	Allotment	35	10	10	5	60	4
URP115	Urban Highway and sanitation I	40	15	15	5	75	5
URP116	Urban Sociology and Urban Habitat	40	15	15	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
URP117	Bilingual training	30	5	5	5	45	3
Total		245	105	65	35	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Urban Planning					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
URP121	Mathematics II	30	25	0	5	60	4
URP122	Computer Science I	30	20	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
URP123	Computer-assisted cartography	40	10	5	5	60	4
URP124	Urban Economics and techniques of investigations	45	20	20	5	90	6
URP125	Knowledge of the Environment	30	15	10	5	60	4
URP126	Public and local finance	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
URP127	Company Creation and civic and Moral education	30	5	5	5	45	3
Total		235	110	70	35	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Urban Planning					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
URP231	Mathematics III	30	25	0	5	60	4
URP232	Physics and Chemistry II	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
URP233	Cycle and management of urban projects	40	15	15	5	75	5
URP234	Organization of work site and demography	40	15	15	5	75	5
URP235	Photogrammetry and Topography	35	10	10	5	60	4
URP236	Urban highway and sanitation II	35	10	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
URP237	Methodology of drafting internship report / Initiation to the Law	30	5	5	5	45	3
Total		245	100	70	35	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Urban Planning					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
URP241	Statistics	30	25	0	5	60	4
URP242	Computer Science II	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
URP243	Site Survey and GPS	30	15	10	5	60	4
URP244	Construction Materials	25	10	5	5	45	3
URP245	Urban planning project and Urban Transport	40	15	15	5	75	5
URP246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
URP247	Accounting and Economics	30	10	0	5	45	3
Total		175	85	130	60	450	30

5. Course content

❖ URP 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ GEO 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;

- Kinetics of solid bodies.

6. **Fluid Mechanics**

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. **Nuclear Reactions**

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. **Pure body and mixtures**

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. **Chemical reactions**

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);

- Molecular model of Lewis;
- Establish an equation of reaction;
- Establish a molar balance sheet;
- Standard enthalpy of reaction;
- Exothermic and endothermic reactions;
- Chemical equilibrium of reaction: Equilibrium constant;

4. **Speed of chemical reaction**

- Set the speed of a reaction by report to a reagent or product ;
- Define the constant speed;
- Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
- Define the Time of half-reaction;
- Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
- Explain the role of a catalyst;
- Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.

5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**

- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
- Oxidation, reduction, torque acido-basic, redox couple;
- Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
- Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
- Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
- The reactions acido-basic;
- Redox reactions.

6. **Organic chemistry**

- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
- Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
- Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
- Distinguish monomer and polymer;
- To distinguish the types of reactions of polymerization;
- Describe the properties of a few industrial polymers.

❖ **URP 113 : Town planning and town planning regulations**

Urbanism and town planning regulations: 4 credits (60 hours); L, T, P, SPW

1. Initiation to urban planning
2. Regulatory Planning
3. Operational Planning
4. Regulation in urban planning
5. National regulation of urban planning
6. Exploitation of regulations of the documents of urban planning
7. Specifications
8. The concepts of standards

❖ **URP 114 : Allotment**

➤ **Subdivision : 4 credits (60 hours); L, T, P, SPW**

1. Definition
2. Conditions for the creation of an allotment
3. Parcelling out
4. Criteria for the assessment of an allotment
5. Insertion of an allotment in an urban fabric
6. Evolution in a city

❖ **URP 115 : Urban highway and sanitation I**

➤ **Urban road and sanitation I: 5 credits (75 hours); L, T, P, SPW**

1. Basic infrastructure in urban areas
2. Standard of construction and mobility
3. Typology of urban roads

❖ **URP 116 : Urban sociology and urban habitat**

➤ **Urban Sociology: 3 credits (45 hours); L, T, P, SPW**

1. Conceptual definition of sociology
2. Social morphologies in urban areas
3. Relations between the members of a community
4. Individual behavior of humans
5. Life in society and urban development

➤ **Urban Habitat: 2 credits (30 hours); L, T, P, SPW**

1. Definition
2. The characteristics of the habitat

3. Typology of the habitat (planned habitat, administered habitat, habitat of low-income populations)
4. Urban fabrics
5. Modes of improvement of the urban habitat
6. Condominium, housing, real estate agencies

❖ **URP 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
 - How to introduce oneself
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;
 - Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**
 - Vocabulaire technique usuel
2. **Grammaire**
 - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
 - De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **URP 121 : Mathematics II**

➤ **Mathematics II: 4 credits (60 hours); L, T, SPW**

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions in several variables - scalar fields and vectors and a few applications

❖ **URP 122 : Computer Science I**

➤ **Computer Science I: 5 credits (75 hours); L, T, P, SPW**

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of computer;

2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Circuits of calculations & memory;
 - Presentation and differences between digital & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, input and output Units);
 - Architecture and performance of microprocessors;
 - Programming a micro-computer (programming binary, hexadecimal, of assembling and evolved languages);
 - Presentation and roles of programs; their applications.
4. **"Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The systems of applications;
 - The programs of applications.
5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ **URP 123 : Cartography assisted by computer**

➤ **Computer-assisted cartography: 4 credits (60 hours); L, T, P, SPW**

1. Contribution of the CAC in urban planning
2. Thematic cartography
3. Cartography databases
4. Geographical coordinates
5. Geo-eferencing and modern cartography
6. Initiation to the geographical information system

❖ **URP 124 : Urban economics and techniques of investigations**

➤ **Urban Economics: 2 credits (30 hours); L, T, P, SPW**

1. Economic activities in urban areas
2. Different sectors of the economy in the city's urban informal economy
3. Economic aggregates
4. Role of economic activities in the functioning of the cities

➤ **Techniques of investigations: 2 credits (30 hours); L, T, P, SPW**

1. Different types of inquiry (exhaustive investigation, survey, census, counting)
2. Elaboration of a questionnaire
3. Target population
4. Representative sample
5. Administration operation and the descriptive analysis of data

❖ **URP 125 : Knowledge of the environment**

➤ **Knowledge of the environment : 5 credits (75 hours); L, T, P, SPW**

1. The physical environment (vegetation and soils, subsoil urban hydrology, climate etc....)
2. Human environment (population, composition, socio-professional category, sex ratio, peopling)
3. Degradation of the urban environment

❖ **URP 126 : Public and local finance**

➤ **Public and local finance: 5 credits (75 hours); L, T, P, SPW**

1. The State budget, budget of investments
2. The operating budget
3. Singleness of coffers
4. Execution and implementation of budgets
5. Local finance in detail
6. The constituent elements
7. The investment budget
8. Administrative accounts
9. Techniques of mobilization of funds for the financing of projects at the communal level

❖ **URP 127 : Creation of company - Civic and moral education**

➤ **Creation of company: 1 credit (15 hour); L, T, SPW**

1. Concept of a contractor
2. Motivations in the creation of a business
3. Research ideas and Evaluation
4. Search for funding
5. Choice of legal status
6. Ethical aspects of company

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ **URP 231 : Mathematics III**

➤ **Mathematics III: 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean vector space
5. Linear applications
6. Matrices

❖ **URP 232 : Physics and Chemistry II**

➤ **Physics III: 3 credits (45 hours); L, T, P, SPW**

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - Spread of heat.

2. Electrodynamics and applications

- Currents and fields;
- Production of magnetic fields;
- The induction phenomenon;
- Alternating current;
- Electromagnetic waves.

➤ Chemistry: Basics of Quality, Health, Safety and Environment 2 credits (30 h) ; L, T, P, SPW

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement.

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;
- Implement a prevention plan or emergency plan in its area of intervention.

4. Regulations and technical standards.

- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
- Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
- Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
- Apply ATEX regulations related to the control of risks related to explosive atmospheres;
- Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **URP 233 : Cycle and management of urban projects**

➤ **Cycle and management of urban projects: 5 credits (75 hours); L, T, P, SPW**

1. Idea of urban project
2. Designing project
3. Implementation of projects
4. Stakeholders and monitoring of projects
5. Evaluation of projects
6. Concept of feasibility and achievability of projects

❖ **URP 234 : Site Organization and demography**

➤ **Site organization : 2 credits (30 hours); L, T, P, SPW**

1. Different compartments of a site
2. Base-life
3. Hygiene and safety in a site
4. The relations of building owner and project manager in a site
5. Operation
6. A site meeting
7. Importance
8. Minutes of the site meetings

➤ **Demography: 3 credits (45 hours); L, T, P, SPW**

1. Characteristics of populations
2. Indices and key concept
3. Study of a population by age
4. Sex
5. Life expectancy
6. The dynamics of the population
7. Birth rate
8. Fertility
9. Growth of the population
10. Migration
11. Immigration
12. Different demographic rates and their ranges
13. Lexis diagram

❖ **URP 235 : Photogrammetry and Topography**

➤ **Photogrammetry and topography : 4 credits (60 hours); L, T, P, SPW**

1. History
2. General principle

3. Geometrical basis
4. Field of application including the development of maps
5. The plans of Mase
6. Slices
7. Restitution of level curves

❖ **URP 236 : Urban road and sanitation II**

➤ **Urban road and sanitation II: 4 credits (60 hours); L, T, SPW**

1. Grid of tracks,
2. Typological verges of urban waters

❖ **URP 237 : Methodology of drafting internship report/ LAW**

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. **General Approach**
 - Nature and contents of internship report;
 - Paragraph;
 - The style and spelling.
2. **Structuring of the document**
 - Cover;
 - Acknowledgments;
 - Heading of the probation report;
 - Executive Summary;
 - List of figures and tables;
 - Glossary;
 - Body of the report of internship;
 - Bibliography;
 - Annexes;
 - Summaries and keywords.

B. Formatting of the probation report

1. **General information**
 - Remission of the probationary report;
 - Choice of software.
2. **Rules of presentation**
 - Size of the probation report;
 - Page layout;
 - Families of fonts;
 - Sizes and styles of fonts;

- Spacings and pagination.
- 3. **Notes at the bottom of the page**
- 4. **Floaters**
 - Tables;
 - Figures;
 - List of figures and tables;
 - Equations;
 - Glossary.
- 5. **Bibliography**
 - Purpose of the bibliographical quotations;
 - Format of bibliographical quotations; pop-up
 - List of bibliographical references;
 - Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ **URP 241 : Statistics**

➤ **Statistics: 4 credits (60 hours); L, T, 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

❖ **URP 242 : Computer Science II**

➤ **Computer Science II : 5credits (75 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**

- Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
- Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ **URP 243 : Site Survey and GPS**

➤ **Site Survey and GPS: 4 credits (60 hours); L, T, P, SPW**

1. Methods of acquisition of geographical data
2. Contribution of GPS
3. Mastery of the use of the GPS
4. Restitution of GPS data

❖ **URP 244 : Construction Materials**

➤ **Construction Materials: 3 credits (45 hours); L, T, P, SPW**

1. Exotic materials
2. Local materials
3. Making the prices of materials
4. Perception of local materials
5. Local materials and cost of construction

❖ **URP 245 : Town planning project and Urban Transport**

➤ **Town planning project: 3 credits (45 hours); L, T, P, SPW**

1. Achievement in varied areas in order to promote a sustainable habit, strengthen social co-education, create a link between neighborhoods and natural spaces, construction of public spaces of quality etc.

➤ **Urban transport: 2 credits (30 hours); L, T, P, SPW**

1. Definition
2. Characteristics of urban transport
3. Offer of urban transport
4. Different modes of transport

5. Interchangeability of the modes of transport
6. Specificity of collective transport: concept of parking

❖ **URP 246 : Professional internship**

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

1. Arrival and integration into the enterprise
2. Working in a company
3. Holding of the internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
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

❖ **URP 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**
 - Definition;
 - Accounting registration;

- Typology.

B. General introduction to the Financial Analysis

- 1. Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
- 2. Study of the structure of the balance sheet**
 - Calculations of ratios.
- 3. Functional analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.
- 4. Differential analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.

C. Analytical management accounting

- 1. Generality on the cage**
 - Objective;
 - Role;
 - Concept of burden.
- 2. Analysis of expenses**
 - Liable burden
 - Direct and indirect expenses;
 - Valorization of stocks.
- 3. Method of full costs**
 - Cost of purchase;
 - Cost of production;
 - Cost of returns;
 - Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

- 1. Notions of general economics**
 - Introduction;
 - Consumption and production;
 - The raising of income;
 - The currency and credit;
 - The prices;
 - The concept of growth and development.
- 2. The Company**
 - Introduction;
 - Typology of enterprises;

- Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
3. **The place of the company in the economic fabric**
- Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
4. **The productive activity**
- The policies and processes of production;
 - The trade policies;
 - Logistics.
5. **The concept of management in the company**
- The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
6. **Information and Communication in the Enterprise**
- Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

Field : CIVIL ENGINEERING

Specialty :
GEOTECHNICS

1. The objective of the training

This specialty aims at the training of technicians capable of conducting geological, geophysical and geotechnical analyses necessary for the achievement of major public or private works. It enables one to collect and treat technical and economic information and use it to make sketches, plans and encrypted tables in preparation for construction sites.

2. Expected skills

→ General skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the geotechnics sectors.

→ Specific skills

- Organize, administer and control a construction site of research or study;
- Make prospecting studies of the surface and basement;
- Conduct geotechnical and recognition studies of sites and develop the technical files and operation estimates;
- Practice methods of investigation (remote sensing, borehole logging, geophysics);
- Provide the means for the exploitation of the deposits and prepare the construction site.

3. Career opportunities

- Geotechnical worker;
- Geologist;
- Career officer;
- Petroleum technician;
- Hydrogeologist.

4. Organization of teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Geotechnics					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
GEO111	Mathematics I	30	25	0	5	60	4
GEO112	Physics and Chemistry I	35	25	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
GEO113	Fundamental geology I and Cartography	40	20	10	5	75	5
GEO114	Analyses and Laboratory tests	5	5	45	5	60	4
GEO115	Soil Mechanics I and cartography	40	20	10	5	75	5
GEO116	Infrastructure - techniques of public works I	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
GEO117	Written Expression and bilingual training	20	20	0	5	45	3
Total		200	130	85	35	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Geotechnics					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
GEO121	Mathematics II	30	25	0	5	60	4
GEO122	Computer science I	35	15	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
GEO123	Fundamental geology II	40	30	0	5	75	5
GEO124	In situ tests and Soil Mechanics II	30	20	20	5	75	5
GEO125	Infrastructure - techniques of public works II	30	15	10	5	60	4
GEO126	Technology of surveys and drilling I	35	10	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
GEO127	Company creation/ Civic and Moral Education	25	15	0	5	45	3
Total		225	130	60	35	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Geotechnics					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
GEO231	Mathematics III	30	25	0	5	60	4
GEO232	Physics and Chemistry II	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
GEO233	Methods of investigation I	20	15	5	5	45	4
GEO234	Technology of surveys and drilling II	25	10	5	5	45	4
GEO235	Hydrogeology	40	20	10	5	75	5
GEO236	Geotechnical techniques and structures I	35	25	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
GEO237	Methodology of drafting internship report / Initiation to the Law	30	10	0	5	45	3
Total		215	125	45	35	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Geotechnics					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
GEO241	Statistics	30	25	0	5	60	4
GEO242	Computer Science II	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
GEO243	Methods of Investigation II	23	13	5	4	45	3
GEO244	Geographical information systems and Topography	35	25	25	5	90	6
GEO245	Geotechnical Techniques and Structures II	28	13	0	4	45	3
GEO246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
GEO247	Accounting and Economics	27	15	0	3	45	3
Total		163	101	130	56	450	30

5. Course contents

❖ GEO 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ GEO 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;
- Kinetics of solid bodies.

6. Fluid Mechanics

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. Nuclear Reactions

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. Pure body and mixtures

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. Chemical reactions

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);

- Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ **GEO 113 : Fundamental Geology I**

➤ **Fundamental Geology I: 4 credits (60 hours); L, T, SPW**

1. **Introduction**
2. **Historical geology**
 - Chronology;
 - Paleontology;
 - Stratigraphy.

❖ **GEO 114 : Analysis and tests in the laboratory**

➤ **Analysis and tests in the laboratory: 4 credits (60 hours); L, T, P, SPW**

1. Laboratory testing for characterization of soils and rocks for use in construction

❖ **GEO 115 : Soil Mechanics I and Cartography**

➤ **Soil Mechanics I : 4 credits (60 hours); L, T, SPW**

1. **Mechanics of theoretical soils**
 - Traction and compression
 - Hooke's law;
 - State plan of constraints;
 - Mohr Circle;
 - The concept of rupture criteria;
 - Plastic equilibrium in the soil.

➤ **Mapping : 3 credits (45 hours); L, T, SPW**

1. Topographical maps
2. Geological maps
3. Geological contours
4. Geological profiles
5. Structural maps

❖ **GEO 116 : Infrastructure - Techniques of Public works I**

➤ **Infrastructure - Techniques of Public works: 3 credits (45 hours); L, T, SPW**

1. **Technology of Infrastructures**
 - building, bridges and art works
2. **Equiping of sites**
3. **Road development**

❖ **GEO 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
- How to introduce oneself

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;
- Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. Vocabulaire

- Vocabulaire technique usuel

2. Grammaire

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ GEO 121 : Mathematics II

➤ Mathematics II: 4 credits (60 hours); L, T, SPW

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

❖ GEO 122 : Computer Science I

➤ Computer Science I: 5 credits (75 hours); L, T, P, SPW

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of the computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;

- Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
 4. **"Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
 5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
 6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ **GEO 123 : Fundamental geology II**

➤ **fundamental geology II: 4 credits (60 hours); L, T, SPW**

1. **The components of the earth crust**
 - Mineralogy;
 - Endogenous petrography;
 - Exogenous petrography;
 - Techniques for the study of minerals and rocks.
2. **Architecture of the earth crust**
 - Tectonics;
 - Structural analysis;
 - Morphogenesis;
 - Sedimentology ;
 - Geological cartography.

❖ **GEO 124 : In situ test and Soil Mechanics II**

➤ **In situ test: 4 credits (60 hours); L, T, P, SPW**

1. Polls
2. Test of mechanical characterization of soils
3. Tests of controls of materials and soils
4. Tests on the rocks

➤ **Soil Mechanics II: 4 credits (60 hours); L, T, SPW**

1. **Properties of soils and rock**
 - Structure, identification;
 - Classification;
 - Compaction;
 - Hydraulics of soils;
 - Shear strength;
 - Compaction and consolidation.

❖ **GEO 125 : Infrastructure - Techniques of Public works II**

➤ **Infrastructure - Techniques of Public works II: 3 credits (45 hours); L, T, SPW**

1. Marine or river Works
2. Geotechnical risks

❖ **GEO 126 : Technology of boring and drilling I**

➤ **Technology of boring and drilling I: 3 credits (45 hours); L, T, P, SPW**

1. The boring machines
2. The tubular equipment and standards
3. The technology of tools

❖ **GEO 127 : Creation of Company and civic and Moral Education**

➤ **Entrepreneurship: 1 credits (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of a company

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ **GEO 231 : Mathematics III**

➤ **Mathematics III: 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ **GEO 232 : Physics and Chemistry II**

➤ **Physics III: 3 credits (45 hours); L, T, P**

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - The spread of heat.
2. **Electrodynamics and applications**
 - Currents and fields;
 - Production of magnetic fields;
 - The phenomenon of induction;
 - Alternating current;
 - Electromagnetic waves.

➤ **Chemistry: Basics of Quality, Health, Safety and Environment : 2 credits (30 hours); L, T, P, SPW**

1. **Management system of a company**

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. **Fight against nonconformities and loop of continuous improvement.**

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. **Risk analysis and prevention.**

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;
- Implement a prevention plan or emergency plan in its area of intervention.

4. **Regulations and technical standards.**

- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
- Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
- Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
- Apply ATEX regulations related to the control of risks related to explosive atmospheres;
- Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **GEO 233 : Methods of investigation I**

➤ **Methods of investigation I: 3 credits (45 hours); L, T, P, SPW**

1. **Remote sensing**

- The different types of photographs;
- The problems related to stereoscopic vision;

- The restitution of relief from a couple of snapshots;
- Influences of the lithology and structure on the morphology and vegetation.

❖ **GEO 234 : Technology of boring and drilling II**

➤ **Technology of boring and drilling II: 3 credits (45 hours); L, T, P,SPW**

1. The different types of circulation
2. The incidents of drilling and their control

❖ **GEO 235 : Hydrogeology**

➤ **Hydrogeology: 4 credits (60 hours); L, T, SPW**

1. Hydrology
2. Undergroundwater

❖ **GEO 236 : Techniques of exploitation and geotechnical structures I**

➤ **Exploitation techniques: 4 credits (60 hours); L, T, P**

1. **Metallogeny**
 - Introduction, classification of mineral deposits;
 - The different types of deposits.
2. **Exploitation of mines and quarries**
 - The different types of exploitation and specific methodologies;
 - Machines;
 - Explosives;
 - Specific legislation.
3. **The aggregates**
 - Operation;
 - Treatment;
 - Specification;
 - Use.

➤ **Geotechnical Techniques and Structures I: 4 credits (60 hours); L, T, SPW**

1. **General processes of the construction of geotechnical structures**
 - Foundations;
 - Supporting walls.

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. General Approach

- Nature and contents of internship report;
- Paragraph;
- The style and spelling.

2. Structuring of the document

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. General information

- Remission of the probationary report;
- Choice of software.

2. Rules of presentation

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. Notes at the bottom of the page

4. Floaters

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. Bibliography

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ **GEO 241 : Statistics**

➤ **Statistics: 4 credits (60 hours); L, T, 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

❖ **GEO 242 : Computer Science II**

➤ **Computer Science II : 5credits (75 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ **GEO 243 : Methods of Investigation II**

➤ **Methods of investigation II: 3 credits (45 hours); L, T, P, SPW**

1. **Geophysics**
 - Definition of the instruments of basic measurement;

- Physical measurement;
 - Ohm's law;
 - Magnetism;
 - The electrical properties of rocks;
 - Seismology.
2. **The Logs**
- General information;
 - The instant logs;
 - The deferred logs;
 - Electrical tools to measure resistivity;
 - The nuclear tools;
 - The sonic tools;
 - The tools of pendagemetry.

❖ **GEO 244 : Geographical information systems and Topography**

➤ **Geographical Information Systems: 3 credits (45 hours); L, T, P**

1. The geographical data (natures, acquisition, representation)
2. Analysis of a GIS
3. Methodology and establishment of a GIS project

➤ **Topography: 3 credits (45 hours); L, T, P, SPW**

1. General
2. Altimetry
3. Planimetry

❖ **GEO 245 : Geotechnical structures II**

➤ **Geotechnical structures II: 3 credits (45 hours); L, T, SPW**

1. Calculation of geotechnical structures

❖ **GEO 246 : Professional internship**

➤ **professional internship I: 6 credits (90 hours); P, SPW**

1. Arrival and integration in the company
2. Working in a company
3. Holding of the internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
5. Elaboration of the research outline
6. Resources to exploit

7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ **GEO 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**
 - Definition;
 - Accounting registration;
 - Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
2. **Study of the structure of the balance sheet**
 - Calculations of ratios.
3. **Functional analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.
4. **Differential analysis of the balance sheet**
 - Definition;
 - Principles;

- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. Generality on the cage

- Objective;
- Role;
- Concept of burden.

2. Analysis of expenses

- Liable burden
- Direct and indirect expenses;
- Valorization of stocks.

3. Method of full costs

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. Notions of general economics

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;
- The prices;
- The concept of growth and development.

2. The Company

- Introduction;
- Typology of enterprises;
- Structure and organization of the enterprise;
- The company and ethics;
- How to undertake (create, decide, manage).

3. The place of the company in the economic fabric

- Concept of the environment of the company;
- The inter- and extra-enterprises relationships;
- The commercial activity;
- The notion of strategy.

4. The productive activity

- The policies and processes of production;
- The trade policies;
- Logistics.

5. The concept of management in the company

- The activity and financial resources;

- The planning and management of human resources;
- The planning and the management of material resources.

6. **Information and Communication in the Enterprise**

- Role of information and communication;
- Collection and organization of information;
- Strategic diagnosis;
- Decision System

Field : CIVIL ENGINEERING

Specialty :

**SANITARY INSTALLATION AND
PLUMBING**

1. The objective of the training

This specialty has as objective to train senior technicians operating in two specific areas: sanitation and the management of waterchain (capture, pipelines, storage, disinfection... construction of latrines).

2. Expected skills

→ Generic skills

- Implementation of the various measurement devices, positioning of data entry and implantation.

→ Specific skills

- Design a draft project of the installation in establishing a quotation and participating in dialogue with the client;
- Study the specifications by performing the calculations of execution and choosing the material;
- Build the infrastructure and all Supply Systems: Techniques of drilling, digging of wells, tracing and establishment of networks of drinking water or irrigation;
- Create the drainage systems, install latrines and sewers;
- Carry out the testing of equipment installed and put them in a state of operation;
- Realize repair work (repair of taps, resolution of problems of leakage of water, replacement devices...) related to the normal wear and tear or obsolescence of the facilities.

3. Career opportunities

- Designer in sanitary installation;
- Maintenance agent;
- Technician for commissioning;
- Design office technician;
- Plumber.

4. Organization of teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Sanitary Installation and Plumbing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SIP111	Mathematics I	30	25	0	5	60	4
SIP112	Physics and Chemistry I	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SIP113	Maintenance	20	20	0	5	45	3
SIP114	Measurement and metrology	30	10	15	5	60	4
SIP115	Technology and Techniques in Civil Engineering	45	30	10	5	90	6
SIP116	Thermodynamics	35	35	0	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SIP117	Bilingual training	25	17	0	3	45	3
Total		215	162	40	33	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Sanitary Installation and Plumbing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SIP121	Mathematics II	30	25	0	5	60	4
SIP122	Computer science I	30	20	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SIP123	Mechanics and Mechanical waves	40	15	0	5	60	4
SIP124	Fluid Mechanics	40	15	0	5	60	4
SIP125	Electricity	40	20	10	5	75	5
SIP126	Thermal transfers and Maintenance	45	20	5	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SIP127	Enterprise creation, Civic and Moral Education	27	15	0	3	45	3
Total		252	130	35	33	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Sanitary Installation and Plumbing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SIP231	Mathematics III	30	25	0	5	60	4
SIP232	Physics and Chemistry II	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SIP233	Thermal transfers II and Organic chemistry	40	20	10	5	75	5
SIP234	Technical studies and Personal Project	30	15	25	5	75	5
SIP235	Fluids	30	15	10	5	60	4
SIP236	Cruise control	30	15	10	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SIP237	Methodology for the drafting of anIR	27	15	0	3	45	3
Total		237	138	43	32	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Sanitary Installation and Plumbing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
SIP241	Statistics	30	25	0	5	60	4
SIP242	Computer Science II / BQHHSE	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
SIP243	Materials and conversion of Energy	30	25	0	5	60	4
SIP244	Maintenance II and study of installations	30	10	15	5	60	4
SIP245	Realisation, implementation procedures and business software, Energy and Environment	30	20	10	0	60	4
SIP246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
SIP247	Accounting and Economics	27	15	0	3	45	3
Total		167	105	125	53	450	30

5. Course contents

❖ SIP 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ SIP 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;

- Kinetics of solid bodies.

6. **Fluid Mechanics**

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. **Nuclear Reactions**

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. **Pure body and mixtures**

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. **Chemical reactions**

- Electronic structure of an atom;

- Bonding (ionic and covalent bonds);
 - Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ SIP 113 : Townplanning and town planning regulations

➤ Statics and dynamics of fluids: 3 credits (45 hours); L, T, SPW

1. Basic concepts and mathematical reminders;

- Preliminary issues;
- A few properties of fluids;
- Balance sheet of material;
- Some actions to which fluids are subjected;
- Trajectory, line of emission and lines of currents of fluid particles within a fluid mass;
- A few major principles of the mechanics of continuous mediums;
- The laws of behavior;
- Mathematical reminders: concept of vector analysis.

2. Statics of fluids

- Pressure in a fluid;
- Pressure variation in a fluid;
- Fundamental Principle of statics of fluids;
- The theorem of Pascal;
- Energy aspect of a fluid;
- Force of pressure.

3. Fluid dynamics

- Energy of a fluid;
- Formulas of compressible and incompressible fluids;
- Distribution of the energy of an incompressible fluid during a flow in permanent regime;
- Equation of pulse and Equation of Euler;
- Applications of the theorem of Euler;
- The force of pressure exerted by a fluid in an enlargement.

❖ SIP 114 : Measurement and metrology

➤ Hydraulics : 4 credits (60 hours); L, T, P, SPW

1. Calculation of loads losses

- Phenomenon of viscosity
- Evaluation of load losses of a fluid?

2. Hydraulic machines

- Hydraulic Pumps
- Study of a pump wheel
- Hydraulic turbines

3. **Fundamental laws and similarities of turbomachinery**

- Composition of speeds;
- Forces;
- Time engine;
- The powers;
- Theorem of Daniel Bernoulli in permanent regime (absolute movement);
- Theorem of Daniel Bernoulli in permanent regime (relative movement);
- Specific speeds: Range of optimal functioning;
- Capacity of response of a turbine in response to variations in drop and water flow;
- Racing speeds;
- Hydraulic turbomachinery working in similitude.

❖ **SIP 115 : Technology and technique in the Civil Engineering**

- **Technology of thermal systems: 3 credits (45 hours); L, T, SPW**
- **Techniques of Civil Engineering: 3 credits (45 hours); L, T, P, SPW**

❖ **SIP 116 : Thermodynamics**

- **Thermodynamics: 5 credits (75 hours); L, T, SPW**
 1. Reminders and mathematical additions and general information on thermodynamics
 2. Fundamental relations of thermodynamics
 3. The first principle of thermodynamics
 4. Second principle of thermodynamics
 5. Study of perfect gases
 6. Calorimetry
 7. Thermometry

❖ **SIP 117 : Bilingual training**

- **English: 1.5 credits (22 hours 30mn)**
 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
 - How to introduce oneself
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;
 - Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**
 - Vocabulaire technique usuel
2. **Grammaire**
 - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
 - De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;

- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **SIP 121 : Mathematics II**

➤ **Mathematics II: 4 credits (60 hours); L, T, SPW**

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

❖ **SIP 122 : Computer Science I**

➤ **Computer Science I: 5 credits (75 hours); L, T, P, SPW**

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of the computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);

- Presentation and roles of programs; their applications.
- 4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
- 5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
- 6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ **SIP 123 : Mechanics and Mechanical waves**

- **Mechanics: 2 credits (30 hours); L, T, SPW**
- **Mechanical waves: 2 credits (30 hours); L, T, SPW**

❖ **SIP 124 : Fluid Mechanics**

- **Mechanics of Hydraulic Fluids: 2 credits (30 hours); L, T**
- **Mechanics of aerodynamic fluids: 2 credits (30 hours); L, T, P, SPW**

❖ **SIP 125 : Electricity**

- **Distribution of electrical energy: 2 credits (30 hours); L, T, P, SPW**
- **Electricity: 3 credits (45 hours); L, T, P, SPW**

❖ **SIP 126 : Thermal Transfer and Maintenance**

- **Thermal transfer I: 2.5 credits (37.5 hours); L, T, P, SPW**
 1. **General information on heat transfer**
 - Concept of heat
 - Concept of temperature
 - Formulation of a problem on the transfer of heat: equation of heat
 - Process of heat exchange
 2. **Heat transfer by conduction**
 - Equation of heat

- Conduction in permanent condition
- 3. **Transfer of heat by convection**
 - Flow condition of fluids.
 - Laminar condition
 - Condition of turbulence or turbulent condition
 - Expression of the flow of heat
 - Determination of the coefficient 'H' of exchange of heat by convection
 - In forced convection
 - In natural convection
 - Convection with change of state
 - Transfer of heat by convection with condensation
 - On a vertical wall
 - On a horizontal wall

➤ **Organization of maintenance II: 2.5 credits (37.5 hours); L, T, P, SPW**

❖ **SIP 127: Creation of Company and civic moral Education**

➤ **Entrepreneurship: 1 credits (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of a company

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ **SIP 231 : Mathematics III**

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ **SIP 232 : Physics and Chemistry II**

➤ **Physics III : 3 credits (45 hours); L, T, P**

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - The spread of heat.
2. **Electrodynamics and applications**
 - Currents and fields;
 - Production of magnetic fields;
 - The phenomenon of induction;
 - Alternating current;
 - Electromagnetic waves.

➤ **Chemistry II : 2 credits (30 hours)**

❖ SIP 233 : Thermal Transfer II and Organic chemistry

➤ Thermal transfers II: 3 credits (45 hours); L, T, P, SPW

1. Thermal transfer by radiation

- Study of the spectrum;
- The laws of exchanges by radiation.

2. Study of Heat Exchangers

- Main types of heat exchangers;
- Description of heat exchangers ;
- The thermal properties of thermal heat exchanger;
- Study of exchangers with complex beams.

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

1. Understand the application of spectrophotometric techniques in the identification of organic compounds

- List the frequency range of UV radiation.
- Explain the effect of the interaction of UV light with organic compounds (electronic transitions).
- Explain electronic transitions in terms of molecular orbital theory (p-p* and n-p*)
- State wavelength in S.I. units and intensity of band as (E)
- Explain that the wavelength of maximum absorption is called λ_{max} and the intensity of absorption at λ_{max} is E_{max} .
- Give and be able to use the Beer- Lambert law relating absorbance to concentration.
- Explain the use of UV spectrum in identification of unsaturated linkages, chromophores and aromatic systems
- Explain how the interaction of infra-red radiation with organic molecules gives rise to stretching, bending, vibration and wagging of the molecules.
- 1.9 Assign absorption frequencies to the following functional groups:
- OH; -OR; -NH₂; -X-C; HC=O; C=O; alkenes; alkynes and nitriles.
- Explain how the "finger print" region between 1450 - 650 L-1 is unique for any compound.
- Explain how the substituent groups attached to a functional group affects the absorption frequency of the functional group e.g. ketones, esters, amides, conjugated carbonyls, substituted aromatic compounds, etc.
- Interpret the spectrum of a known compound.
- Explain the theory of NMR.
- Explain the term chemical shift with particular attention to chemical shift values for H¹.

- Understand that chemical shift is affected by the electronic environment of the nucleus - deshielding and shielding effects.
 - Identify chemical shifts for different types of protons e.g. -OH, -CH₂, -Ar-H, etc.
 - Understand and be able to predict equivalence of hydrogen atoms in a molecule.
 - State the scales adopted for H¹ nmr spectrum.
2. **Understand the chemistry of monosubstituted aromatic compounds and compare their reactions with those of their aliphatic analogues**
- Aromatic compounds (by halogenation, nitration, sulphonation, alkylation, acylation) State the general formulae for monosubstituted aromatic compounds.
 - Describe the physical and chemical properties of monosubstituted aromatic compounds.
 - State IUPAC names for monosubstituted aromatic compounds.
 - Know how to prepare monosubstituted from non-substituted aromatic compounds
 - Compare reactions of monosubstituted aromatic compounds with non-aromatic compounds
 - List uses of monosubstituted aromatic compounds.
3. **Understand the principles of organic reaction mechanism applied to aromatic system**
- Describe the following types of reactions, encountered in organic chemistry - addition, elimination, substitution and re-arrangement reactions
 - Explain the following:
 - Inductive, Mesomeric and Electromeric effects
 - Identify ortho, para and meta positions on a monosubstituted aromatic compound.
 - List examples of ortho-para directing and meta directing groups.
 - Explain the term electrophiles and nucleophiles.
 - Describe the mechanism of electrophilic aromatic substitution and nucleophilic aromatic substitution. electrophilic substitution with respect to the following:
 - Halogenation of benzene
 - Nitration of benzene
 - Sulphonation of benzene
 - Friedel craft reactions.
 - Draw diagrams of Energy against reaction co-ordinate for the above reactions and relate the shape of the Energy curves to the mechanism of the reaction (i.e. label the diagram)

- List the differences between electrophilic aromatic substitution and nucleophilic aromatic substitution.
- List other reactions of aromatic hydrocarbons like addition and oxidation reactions.
- Describe SN1 and intermediate complex mechanism to aromatic nucleophilic substitution.
- Know selected reactions of arenes: (oxidation of alkyl side chains, reduction of benzylic alcohols and ketones, chlorination of toluene)
- Know selected reactions of aromatic substituents (reduction of the nitro group, oxidation of amino)

❖ **SIP 234 : Technical studies and Personal Project**

➤ **Personal and Professional project: 3 credits (45 hours); L, T, P, SPW**

➤ **Technical studies: 2 credits (30 hours); L, T, P, SPW**

❖ **SIP 235 : Fluid**

➤ **Fluids and Networks: 2 credits (30 hours); L, T, P, SPW**

➤ **Fluids: 2 credits (30 hours); L, T, P, SPW**

❖ **SIP 236 : Regulation**

➤ **Regulation: 2 credits (30 hours); L, T, P, SPW**

1. **Introduction to regulation and automatics**
 - Purpose;
 - Definitions;
 - Basic principles.
2. **Mathematical description and dynamics of typical linear systems (1st and 2nd order)**
 - Modeling and equation;
 - Laplace transformation;
 - Transfer function;
 - Temporal analysis;
 - Performance of Systems (response time, stability, precision, overflow, etc.).

3. **Regulation of industrial systems (basics)**

- Operational objectives;
- Modes of regulation;
- Technology of the regulators;
- Regulation procedure and application to a few examples in the industry and in refrigeration.

4. **Regulation of refrigerated facilities**

- Objectives and specificities of the Regulation of refrigeration circuits;
- Study of a few techniques of regulation : temperature, pressure, the refrigerant level, oil, vacuum, defrosting;
- Study of regulators of flow supply in fluid (different regulators).

5. **Regulation of systems in air conditioning**

- Study of a few regulating systems used in air conditioning (central processing of air, systems of direct relaxation, group of production of ice water, fan-coil units, pumps in icy water, VRC systems, etc.).

6. **Introduction to the technical management of the building and the rational use of energy in air conditioning in the building**

➤ **Realization and implementation of the procedures I: 2 credits (30 hours); L, T, P, SPW**

1. Certification of a sanitary installation
2. Maintenance of sanitary installations
3. Sealing

❖ **SIP 237 : Methodology of drafting the internship report / LAW**

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. General Approach

- Nature and contents of internship report;
- Paragraph;
- The style and spelling.

2. Structuring of the document

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;

- Summaries and keywords.

B. Formatting of the probation report

1. General information

- Remission of the probationary report;
- Choice of software.

2. Rules of presentation

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. Notes at the bottom of the page

4. Floaters

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. Bibliography

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

➤ Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ SIP 241 : Statistics

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

1. Descriptive statistics of a dimension
2. Linear regression

3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ **SIP 242 : Computer Science II**

➤ **Computer Science II : 5credits (75 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ **SIP 243 : Materials and conversion of energy**

➤ **Conversion of energy : 2 credits (30 hours); L, T, SPW**

➤ **Organic materials: 2 credits (30 hours); L, T, SPW**

❖ **SIP 244 : Maintenance II and study of Installations**

➤ **Technique of maintenance, conduct, prevention II: 2 credits (30 hours); L, T, P, SPW**

1. **The problem of the maintenance of domestic sanitary installations**
2. **Planning of interventions**
3. **Periodicity and typology of interventions**
4. **The installation and maintenance of the following equipment**
 - Installation and maintenance of a sink;
 - Installation and maintenance of a washbasin;
 - Installation and maintenance of a bathtub;
 - Installation and maintenance of a shower;
 - Installation and maintenance of a WC;
 - Installation and maintenance of a water heater.

5. Practical work on piping

- Formatting of fittings (tube cutting, bending, beaten collars) work practices;
- Practice of the annealing of strained copper tube;
- Method of bending of copper tube;
- The means of assembling copper tube;
- Strong solder / capillary solder with tin;
- Mending on a pipe.

➤ Study of Installations: 2 credits (30 hours); L, T, P, SPW

1. The connections

- The power supply;
- The distribution;
- The evacuation;
- The production of hot water;
- Sanitary facilities;
- The valves;
- Aeration;
- The parts of water.

2. Piping:

- Piping;
- Choice of materials;
- Comparison of the different tubes;
- Conditions of placing of pipes;
- Plot of the pipes;
- Hidden and apparent pipes;
- Examples of evacuation;
- Assemblies and tapings;
- Dilation of the pipes;
- The casings;
- Buried pipes;
- Isolation against the noise.

3. The sanitary appliances

- Sanitary appliances:
 - The washbasins;
 - The bidets;
 - The bathtubs;
 - The shower trays;
 - The WC;
 - The sinks;
 - Arrangement of a bathroom.

4. **Taps**

- Mixing taps, mixers;
- The evacuation system and drain;
- Plug valve, grid valve, siphons.

5. **Technical ducts**

6. **Industrial tap fittings**

- Definition and function;
- Quality of an element of taps;
- Parameter determining the choice;
- Family of taps;
- Evolution of general industrial tap fittings;
- Current types of taps;
- Tap for specific applications;
- Materials commonly used;
- Connecting;
- The actuators;
- Concept on the seal;
- Behaviour of tap in front of fluid.

7. **The Tubes, pipes and fittings**

- Lead piping;
 - Tin and torch soldering;
- Copper line;
 - Soldering fittings;
 - Folded snares;
- Pipe in cast iron;
- Steel pipe;
- Pipe in PVC;
- Pipe in PVC pressure, PERT:
 - Connection of the pipes with the devices.

8. **Water supply**

- The interior distribution network : Design the schema for the operation principle;
- Provision (cold and hot water).

9. **The evacuations**

- System of sanitary drainage:
- Water to be evacuated
 - Flowcapacities of devices;
 - Dimensions of the falls and nentilations.
- The Wastewater:
 - Evacuations of wastewater in function of pipes;
 - Ventilation caps and anti- empty valve;
 - Slopes and feet of falls;
 - The water valves:

- Evacuations of water valves.
- Rain water:
 - Section of the gutters and eaves;
 - Siphon at the bottom of the descents.
- Purifications of wastewater:
 - Septic tanks for all waters;
 - Grease tray, sewage, filtering wells;
 - Micro-water treatment station.
- Ventilation
- Independent sanitation:
 - Design the schema of the principle of operation;
 - Sizing.

10. **Industrial tap fittings**

- Concept on the transfer function;
- Control systems;
- Automation in open loop;
- Automation in a closed loop;
- Combined automation;
- Functional diagram of a system of regulation and servo control;
- Constituent elements of a control loop;
- Properties of a controlled system;
- Introduction to the modeling of systems.

11. **Acoustics : the noise in the sanitary facilities**

- Acoustic terminology:
 - Sound level and weighting;
 - Flow velocity in the pipes;
 - Noise of taps;
 - Ram blows.
- Noise prevention in the facilities:
 - Regulators, fixing of sanitary appliances;
 - Install anti vibratiles;
 - Install bidets;
 - Install bathtubs;
 - Install shower trays and sinks;
 - Install water heaters;
 - Emptying noises

❖ **SIP 245 : Realization, implementation procedures and business software, energy and the environment**

➤ **Realization and implementation of procedures II: 2 credits (30 hours);L,T, P**

➤ **Business software, energy and the environment: 2 credits (30 hours); L, T, P**

❖ **SIP 246 : Professional internship**

➤ **professional internship I: 6 credits (90 hours); P, SPW**

1. Arrival and integration in the company
2. Working in a company
3. Holding of the Internship journal
4. Choice of the theme of work in collaboration with the professional trainer and the academic supervisor
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

❖ **SIP 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**
 - Definition;
 - Accounting registration;
 - Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
2. **Study of the structure of the balance sheet**
 - Calculations of ratios.
3. **Functional analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.
4. **Differential analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.

C. Analytical management accounting

1. **Generality on the cage**
 - Objective;
 - Role;
 - Concept of burden.
2. **Analysis of expenses**
 - Liable burden
 - Direct and indirect expenses;
 - Valorization of stocks.
3. **Method of full costs**
 - Cost of purchase;
 - Cost of production;
 - Cost of returns;
 - Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. **Notions of general economics**
 - Introduction;
 - Consumption and production;
 - The raising of income;
 - The currency and credit;
 - The prices;
 - The concept of growth and development.
2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;

- The company and ethics;
 - How to undertake (create, decide, manage).
3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
 4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
 5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
 6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

Field : CIVIL ENGINEERING

Specialty :

BUILDING SCIENCE AND TECHNOLOGY

1. The objective of the training

This specialty leads to the training of specialists in building, with good knowledge in all the techniques of a new construction or rehabilitation, as well as in the process of realization of a piece of work. The student learns to manage a construction site in guaranteeing the advancement, the quality and safety.

2. Expected skills

→ General skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of Building sectors.

→ Specific skills

- Coordinate a construction site or a team of labor force in a construction site; -
- Elaborate the estimates/quotes;
- Draw setting out and architects plans, and interpret them
- Develop the briefings and prepare the records of work;
- Assist the engineer in the design office or at the construction site; - writing of reports on the construction site.

3. Career opportunities

- Head of construction site;
- Foreman;
- Draftsman; - person in charge of prices;
- Person in charge of transactions.

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Building Science and 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							
BST111	Mathematics I	30	25	0	5	60	4
BST112	Physics and Chemistry I	35	23	12	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BST113	General construction processes	25	15	0	5	45	3
BST114	Design and building Technology	40	15	0	5	60	4
BST115	sites organization	45	25	0	5	75	5
BST116	Architecture and resistance of materials I	35	40	10	5	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BST117	Bilingual Training	25	15	0	5	45	3
Total		230	163	27	30	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Building Science and 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							
BST121	Mathematics II	30	25	0	5	60	4
BST122	Computer Science I	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BST123	Design office and projects	40	20	10	5	75	5
BST124	Topography I	20	10	10	5	45	3
BST125	Reinforced concrete I	30	25	0	5	60	4
BST126	Geotechnics and resistance of materials II	55	20	10	5	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BST127	Creation of Company and Civic and Moral Education	30	10	0	5	45	3
Total		240	130	45	35	450	30

- THIRD SEMESTER**

Field: Civil Engineering		Specialty: Building Science and 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							
BST231	Mathematics III	30	30	0	0	60	4
BST232	Physics and Chemistry II	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BST233	Equipment and Materials	55	20	0	0	75	5
BST234	Resistance of Materials III	20	10	10	5	45	3
BST235	Reinforced concrete II and Computer Assisted Drawing I	35	15	35	5	90	6
BST236	Processes and techniques of realization	30	15	0	0	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BST237	Methodology of drafting internship report / LAW	30	10	0	5	45	3
Total		240	120	70	20	450	30

- FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Building Science and 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							
BST241	Statistics	30	30	0	0	60	4
BST242	Computer Science II	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BST243	Design office II and Computer Assisted Drawing II	30	10	30	5	75	5
BST244	Foundations and retaining structures	20	10	15	0	45	3
BST245	Topography II and tests	25	10	20	5	60	4
BST246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BST247	Accounting and Economics	30	10	0	5	45	3
Total		155	80	165	50	450	30

5. Course contents

❖ **BST 111 : Mathematics I**

➤ **Mathematics I: 4credits (60 hours); L, T, SPW**

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ **BST 112 : Physics and Chemistry**

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;

- Kinetics of solid bodies.

6. **Fluid Mechanics**

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. **Nuclear Reactions**

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. **Pure body and mixtures**

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. **Chemical reactions**

- Electronic structure of an atom;

- Bonding (ionic and covalent bonds);
 - Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ **BST 113 : General construction processes**

➤ **General construction processes I: 3 credits (45 hours); L, T, SPW**

1. General information
2. Description of steels
3. Different parts of a piece of work
4. Steps in the realization of works
5. Formwork Technology

❖ **BST 114 : Design and Technology of the building**

➤ **Design and technology of building: 3 credits (45 hours); L, T, SPW**

1. General information
2. The conventions and standards of representations in Civil Engineering design
3. Architecture drawing
4. Different types of tasks
5. The Project

❖ **BST 115 : Sites organization**

➤ **Organization of work sites : 4 credits (60 hours); L, T, P**

1. General principles of the OST
2. Preparation and execution (installation, material, scheduling)
3. The handling
4. Supply and storage of materials
5. Qualitative study of sites works
6. Formwork rotation
7. Study of earth works
8. Concreting

❖ **BST 116 : Architecture and resistance of materials I**

➤ **Architecture: 4 credits (60 hours); L, T, P, SPW**

1. **A technological approach of the different parts of the architect plans**
2. **Graphical documents**
 - Plans;
 - Sections ;
 - Detailed drawing;
 - Profiles.

3. **Forms of the construction and all its dimensions.**
4. **The plans**
 - Definition of a plan;
 - Plan rating architecture;
 - The sections of the plans architectures.
5. **Conventions of the representation of works of arts**

➤ **Resistance of Materials i: 4 credits (60 hours); L, T, SPW**

1. General information
2. Theory and stability of beams
3. Stresses and deformations
4. Simple sollicitations
5. Studies of straight beams and statically determinate arcs
6. Instability of forms (case of buckling)

❖ **BST 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
 - How to introduce oneself
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;
 - Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**

- Vocabulaire technique usuel

2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **BST 121 : Mathematics II**

➤ **Mathematics II: 4 credits (60 hours); L, T, SPW**

1. Numerical sequences
2. Numerical series
3. The Fourier series

4. Laplace transform
5. Fourier transform
6. Functions with several variables - scalar fields and vectors and some applications

❖ **BST 122 : Computer Science I**

➤ **Computer Science I: 5 credits (75 hours); L, T, P, SPW**

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of the computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ **BST 123 : Design office and projects**

➤ **Reinforced concrete Projects : 3 credits (45 hours); L, T**

1. **Define a problematic**
 - Know how to analyze and present a problem from a complex situation

2. **Mastery of time**

- Know to break down a project into phases and basic tasks;
- Estimate the time and implementation deadlines, build a time frame.

3. **Work in a group**

- Master the various compartments of group work

4. **Negotiate**

- Know-how, but also strike a consensus with partners (clients or members of the project group)

5. **Evaluate**

- What indicators;
- What evaluation criteria guarantee the quality of the project.

6. **Master oral and written presentation**

➤ **General construction processes II: 2 credits (30 hours); L, T, SPW**

1. **Qualitative study of work sites**

- Description of steels
- Different parts of a piece of work
- Steps in the realization of works
- Formwork Technology

❖ **BST 124 : Topography I**

➤ **Topography I: 3 credits (45 hours); L, T, P, SPW**

1. **General information**

- Purpose and Role of measurements;
- Notion of scale and precision of measurement.

2. **The different topographical devices**

3. **Flat representation**

- Zero NGF (national level survey France) and geodetic point;
- Change of coordinate axis.

4. **Gradients and distances**

- Theory of levelling;
- Methods of measurement of lengths.

5. **Angles and polygonation**

6. **Implantation**

- Calculation;
- Implantation of curves using theodolite and optical square.

❖ **BST 125 : Reinforced concrete I**

➤ **Reinforced concrete I: 4 credits (60 hours); L, T, SPW**

1. General information
2. Principles and hypotheses of justification of the sections
3. Calculation model of the limit state
4. Verification of the sections in the E.L.U. and E.L.S. according to BAEL90 and Eurocode 90
5. Condition of non fragility, deformation

❖ **BST 126 : Geotechnics and resistance of materials II**

➤ **Geotechnical Engineering: 3 credits (45 hours); L, T, P, SPW**

1. Introductory remarks and contextualisation
2. Knowledge of soils (notions of geology)
3. Physical characteristics of soils (identification and classification, trials)
4. Water in the soil (hydraulic properties of soils)
5. Consolidation and compaction of soils

➤ **Resistance of Materials II: 3 credits (45 hours); L, T**

1. General information
2. The conventions and standards of representations in Civil Engineering drawing
3. Architecture drawing
4. Different types of loads
5. The Project

❖ **BST 127 : Creation of Company and civic and moral education**

➤ **Entrepreneurship: 1 credits (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects ofacompany

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;

- Publics Property unto collective's goods;
- 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

❖ **BST 231 : Mathematics III**

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ **BST 232 : Physics and Chemistry II**

➤ **Physics III : 3 credits (45 hours); L, T, P**

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - The spread of heat.
2. **Electrodynamics and applications**
 - Currents and fields;
 - Production of magnetic fields;

- The phenomenon of induction;
- Alternating current;
- Electromagnetic waves.

➤ **Chemistry: Basics of Quality, Health, Safety and Environment : 2 credits (30 hours); L, T, P**

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement.

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;
- Implement a prevention plan or emergency plan in its area of intervention.

4. Regulations and technical standards.

- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
- Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
- Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
- Apply ATEX regulations related to the control of risks related to explosive atmospheres;
- Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **BST 233 : Equipment and Materials**

➤ **Building equipment: 2 credits (30 hours); L, T**

1. Fundamental size (flux, intensity, Luminance)
2. Sources and lighting equipment
3. Interior lighting (plan and networks)
4. Natural and mixed lighting
5. Technology of electrical installations

➤ **Construction materials: 3 credits (45 hours); L, T**

A. First part

1. Properties of fresh concrete;
2. Properties of hardened concrete;
3. Properties of Soils;
4. Realisation of elementary works in B.A (beam, pole, slab).

B. Second part

1. Proctor Test;
2. Penetration Test;
3. Test of softening point of bitumen;
4. Determination of the densities of Civil Engineering Materials;
5. Other tests;
6. Tests of land identification and field tests;
7. Production of BTC, adobes, cob panels;
8. Production of tiles from vibrated mortar (TMV);
9. Quality control, criteria and test procedure;
10. Masonry of adobes and BTC;
11. Installing the frames and tiles (TMV);
12. The treatment of surfaces: supports, types of coatings, materials etc.

❖ **BST 234 : Resistance of Materials III**

➤ **Resistance of Materials III: 3 credits (45 hours); L, T, P, SPW**

1. General information
2. The conventions and standards of representations in Civil Engineering drawing
3. The drawing of architecture
4. Different types of loads
5. The Project

❖ **BST 235 : Reinforced Concrete II and computer assisted drawing I**

➤ **Reinforced concrete II: 3 credits (45 hours); L, T, P, TPE**

1. **Define a problematic**
 - Know how to analyze and pose a problem from a complex situation.
2. **Control the time**
 - Know how to break down a project in phase and basic tasks;
 - Estimate the time and implementation deadlines, build up a calendar.
3. **Work in a group**
 - Control the various compartments of the working in group
4. **Negotiate**
 - Know how to do, but also to obtain a consensus with partners (clients or members of the Group project)
5. **Evaluate**
 - What indicators;
 - What evaluation criteria guarantee the quality of the project.
6. **Master oral and written presentation**

➤ **Computer Assisted Drawing I (CAD): 4 credits (60 hours); L, P, SPW**

1. Know the different models used in CAD/CAM
2. Choice and characteristics of the hardware
3. The databases in CAD/CAM
4. The interfaces and exchanges

❖ **BST 236 : Processes and techniques of realization**

➤ **Processes and techniques of realization : 3 credits (45 hours); L, T**

1. Foundation realization
2. Underpinning
3. Upper floor realization (hollow and solid)

❖ **BST 237 : Methodology of drafting internship report /Law**

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. **General Approach**
 - Nature and contents of internship report;
 - Paragraph;

- The style and spelling.
- 2. **Structuring of the document**
 - Cover;
 - Acknowledgments;
 - Heading of the probation report;
 - Executive Summary;
 - List of figures and tables;
 - Glossary;
 - Body of the report of internship;
 - Bibliography;
 - Annexes;
 - Summaries and keywords.

B. Formatting of the probation report

1. **General information**
 - Remission of the probationary report;
 - Choice of software.
2. **Rules of presentation**
 - Size of the probation report;
 - Page layout;
 - Families of fonts;
 - Sizes and styles of fonts;
 - Spacings and pagination.
3. **Notes at the bottom of the page**
4. **Floater**
 - Tables;
 - Figures;
 - List of figures and tables;
 - Equations;
 - Glossary.
5. **Bibliography**
 - Purpose of the bibliographical quotations;
 - Format of bibliographical quotations; pop-up
 - List of bibliographical references;
 - Bibliographical references for electronic documents.

➤ Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ BST 241 : Statistics

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

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ BST 242 : Computer Science II

➤ Computer Science II : 5credits (75 hours); L, T, P, SPW

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ BST 243 : Design office II and computer-assisted Drawing II

➤ Study of Price: 2 credits (30 hours); L, T, SPW

1. **The acts of take offs**
 - Summary estimates;
 - Quotes;
 - Records of works;
 - States of the situation;
 - Pro rata account;
 - Revision of prices.

2. Integrating estimate of costs

- The costs of materials and supplies;
- The production costs (human, material, transport, etc.);
- The cost of subcontracting;
- The costs of construction site;
- General costs;
- Formalize a price offer.

➤ **Computer Assisted Drawing II: 3 credits (45 hours); L, T, P, SPW**

1. Plandrawing
2. 3D drawing
3. Graphics reproduction
4. Interior installations

❖ **BST 244 : Foundations retaining structures**

➤ **Foundations and retaining structure: 3 credits (45 hours); L, T, P**

1. Shear strength
2. Earth pressures
3. Retaining structures
4. Shallow foundations
5. Deep foundations

❖ **BST 245 : Topography II and tests**

➤ **Laboratory testing: 2 credits (30 hours); P, SPW**

1. Proctor Test
2. Penetration Test
3. Test of softening point of bitumen
4. Determination of the densities of Civil Engineering Materials
5. Other tests
6. Tests of land identification and field testing
7. Production of BTC, Adobes, cob
8. panels
9. Production of tiles of vibrated mortar (TMV)
10. Quality control, test and test procedure
11. Masonry of adobes and BTC
12. Install the frames and tiles (TMV)
13. The treatment of surfaces: supports, types of coatings, materials etc.

➤ **Topography II: 2 credits (30 hours); L, T, P, SPW**

1. Concepts on the theories of errors
2. Determination of the directions and measurement of horizontal angles
3. Measurement of distances
4. Radiation
5. Polygonal path

❖ **BST 246 : Professional internship**

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

1. Arrival and integration in the enterprise
2. Working in an enterprise
3. Holding of the Internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
5. Elaboration of the research outline
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ **BST 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.

5. The depreciation and amortization

- Definition;
- Accounting registration;
- Typology.

B. General introduction to the Financial Analysis

1. Analysis of the balance sheet

- Summary presentation of the balance sheet.

2. Study of the structure of the balance sheet

- Calculations of ratios.

3. Functional analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

4. Differential analysis of the balance sheet

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. Generality on the cage

- Objective;
- Role;
- Concept of burden.

2. Analysis of expenses

- Liable burden
- Direct and indirect expenses;
- Valorization of stocks.

3. Method of full costs

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ **Economics: 2 credits (30 hours); L, T, SPW**

1. Notions of general economics

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;

- The prices;
 - The concept of growth and development.
2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
 3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
 4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
 5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
 6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

Field : CIVIL ENGINEERING

Spéciality :

WOOD WORKS

Option :

CARPENTRY

FIELD :

CIVIL ENGINEERING

Specialty:

Wood works

Option:

Carpentry

1. The objective of the training

Carpentry is a skilled trade in which the primary work performed is the cutting, shaping and installation of building materials during the construction of building, ships, timber bridges, concrete formwork...

2. Expected skills

→ General skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engagein the management of the project;
- Know and make use of professional networks and institutions of the carpentry sectors.

→ Specific Skills

- Read and interpret blueprints drawing and sketches to determine specifications and calculate requirement.
- Prepare layouts in conformity with building codes, using measuring tools
- Measure, cut shape assemble and join materials made of wood, wood substitutes, lightweight steel and other materials
- Build foundations, install floor beams, lay subflooring and erect walls and roof systems
- Fit and install trimming items, such as doors, stairs, molding and hardware.
- Maintain, repair and renovate residences and wooden structures in mills, mines, hospitals, industrial plants and other establishments
- Supervise apprentices and other construction workers
- Prepare cost estimates for clients.

3. Career opportunities

- Building contractor
- Self- employed contractors
- Construction companies
- Residential / commercial
- Carpenter-joiner
- Carpenter housing maintenance
- Maintenance carpenterMetal framer; Roofer
- Preparatory carpenter;
- Construction technology; Using machine.

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Wood Works Option: Carpentry					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CAR111	Mathematics I	20	15	15	10	60	4
CAR112	Physics And Chemistry I	30	20	15	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CAR113	Health safety/ types of materials	25	5	10	5	45	3
CAR114	Wood& wood product / Joints and Fasteners	15	10	45	5	75	5
CAR115	Power Tool and Equipment/Rigging/ Acess structure	30	10	45	5	90	6
CAR116	Plans,specifications and codes	30	10	10	10	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CAR117	Bilingual Training	20	10	10	5	45	3
Total		170	80	150	50	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Wood Works Option: Carpentry					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CAR121	Mathematics II	40	15	10	10	75	5
CAR122	Computer Science I	30	15	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
CAR123	Estimation,calculation,Welding I	40	10	20	5	75	5
CAR124	Residential Construction	25	10	20	5	60	4
CAR125	Floor Systems/ Wall and Ceiling Framing	20	15	20	5	60	4
CAR126	Equal and unequal slope roofs	25	10	35	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CAR127	Company Creation and civic and Moral Education	10	10	20	5	45	3
Total		170	80	150	50	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Wood Works Option: Carpentry					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CAR231	Mathematics III	30	15	10	5	60	4
CAR232	Physics And Chemistry II	30	15	20	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CAR233	Exterior and Interior finishing/ Trusses/ Building Envelop	20	10	40	5	75	5
CAR234	Plans, Specifications and codes II	40	10		10	60	4
CAR235	Layout-Transit and Level/ Excavation, Shoring and Re-shoring/ Footing and Deep Foundations	35	15	20	5	75	5
CAR236	Formwork and Concrete Structures	20	10	25	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CAR237	Methodology of drafting internship report/ LAW	20	10	10	5	45	3
Total		195	85	125	45	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Wood Works Option: Carpentry					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
CAR241	Statistics	30	15	10	5	60	4
CAR242	Computer Science II /BQHHSE	30	15	20	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
CAR243	Interior and Exterior finishing II	30	10	15	5	60	4
CAR244	Stairs & Ramps/Timber construction	20	10	40	5	75	5
CAR245	Plans, specification and codes/ estimating calculations & layout	15	10	15	5	45	3
CAR246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
CAR247	Accounting and Economics	20	10	10	5	45	3
Total		145	70	170	65	450	30

5. Course content

❖ **CAR 111 : Mathematics I**

➤ **Mathematics I: 4credits (60 hours); L, T, SPW**

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ **CAR 112 : Physics and Chemistry**

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

Mechanics

1. Kinematics

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. Action of forces on a material point

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. Gravitation

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. Work, power, energy and momentum

- Work;
- Power;
- Energie;
- Momentum

5. Action of the forces on a solid body

- Statics;
- Kinetics of solid bodies.

6. Fluid Mechanics

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. Nuclear Reactions

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. Pure body and mixtures

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. Chemical reactions

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);

- Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ **CAR 113 : Health Safety/ Types of Materials**

➤ **Health Safety: 1,5 credits (22 hours 30 min); L, T, P, SPW**

1. Apply safety legislation found in the *Occupational Health & Safety Act (OHSA)*, *Workers Compensation Act*, and the *Environmental Protection Act*, and apply the prescribed procedure when reporting an accident or hazard
2. State individual rights and responsibilities with regards to personal health and fitness, general safety, and work refusal
3. Select, wear, and maintain personal protective devices, making sure of proper fitting and optimum protection in accordance with manufacturers' instructions and OHSA
4. Identify WHMIS labels and data sheets, use safe handling and disposal techniques, and report hazards to supervisor
5. Apply safety measures in the workshop and at the job site by using appropriate measures for lifting and handling material and equipment, using electrical protection and safety devices on tools and equipment, and by following good housekeeping practices
6. Identify common temporary safety components such as guard rails, barricades, ramps, stairs, hoarding, etc.
7. Apply fire safety practices in the workplace, select appropriate fire extinguishers for class A, B, C, and D fires, activate alarms, and communicate the danger to others. Identify propane licensing requirements
8. Describe environmental awareness throughout a renovation

➤ **Types of Materials: 1,5 credits (22 hours 30 min); L, T, P, SPW**

1. Identify the different types of sealants, adhesives, caulking, and state their intended use and application
2. Identify the different types of finishing coatings and preservatives and state their intended use and application
3. Identify the different types of metal, plastic and composite products and state their intended use and application
4. Identify interior and exterior finishing material used in both residential and commercial construction and state their intended use and application
5. Identify materials used in air, moisture, sound and thermal control for all types of buildings and state their intended use and application

❖ **CAR 114 : Wood and Wood Product / Joints and Fasteners**

➤ **Wood & Wood Product: 3 credits (45 hours); L, T, P, SPW**

1. Identify the characteristics of wood and lumber according to species, grade, and moisture content
2. State the different methods used to saw and cut trees into lumber and determine their respective effects on its function, performance and conservation practices
3. State the proper methods for safely handling and storing lumber in order to minimize damage
4. Identify the different types of panel products such as plywood, OSB, particle board, MDF, etc. and state their intended use and application
5. Identify the different types of structural engineered products (such as PSL, LVL, truss joists, and similar products) and state their intended use and application

➤ **Joints and Fasteners: 2 credits (30 hours); L, T, P, SPW**

1. Identify common types of wood joints and state their respective applications
2. Identify, select and use appropriate fasteners, adhesives, and glues in accordance with materials, joints, and manufacturers' specifications
3. Use measuring, layout, and cutting tools to produce specified wood joints and connections

❖ **CAR 115 : Power Tool and Equipment / Rigging / Access Structure**

➤ **Power Tool and Equipment: 2 credits (30 hours); L, T, P, SPW**

1. Identify and state the function of common portable power tools, drawn from the equipment listed below
2. Identify and state the function of common stationary power tools drawn from the equipment listed below
3. Design and use prefabricated and site-fabricated jigs for specific power tools
4. Select, operate and maintain common portable power tools and equipment drawn from the equipment listed on page TBD for specific

applications in accordance with the Occupational Health and Safety Act (OHSA) and manufacturers' instructions

5. Select, operate and maintain stationary power tools and equipment drawn from the equipment listed on page TBD and apply and use with appropriate accessories in accordance with manufacturers' instructions

➤ **Rigging: 2 credits (30 hours); L, T, P, SPW**

1. Identify and describe hazards associated with rigging
2. Describe and apply various rigging and hoisting techniques including manual handling and hoisting with fiber and wire ropes
3. Identify and tie common knots used in rigging
4. Identify and apply international hand signals

➤ **Access structure: 2 credits (30 hours); L, T, P, SPW**

1. Identify and select various types of ladders.
2. Identify and select scaffold access equipment.
3. Demonstrate the safe use of ladders.
4. Demonstrate the safe erection and dismantling of scaffold equipment.
5. Describe the requirements pertaining to ladders and scaffold equipment in accordance with the *Occupational Health and Safety Act (OHSA)*.

❖ **CAR 116 : Plans, Specifications and Codes I (PSC)**

➤ **Plans, Specifications and Codes I (PSC) : 4 credits (60 hours); L, T, P, SPW**

1. **Related Services And Authorities**

- Identify the relationship between owner and architect, contractor, and trades people.
- Identify various types of plans and specifications used in the construction industry.
- Identify the construction controlling authorities, regulations, codes, and by-laws.
- Identify relevant provisions of the Ontario Building Code (OBC).

2. **Drawing Related Equipment and Identification**

- Identify drawings
- Identify views and sections
- Identify the Alphabet of Lines
- Identify Drafting Equipment

3. **Plans And Sketches: Reading**

- Read and interpret orthographic drawings
- Read and interpret isometric drawings

4. **Plans And Sketches: Drawing**

- Read and interpret orthographic drawings
- Read and interpret isometric drawings

❖ **CAR 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
- How to introduce oneself

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;
- Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**

- Vocabulaire technique usuel

2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des texts de nature diverses (littéraire, non littéraire,image fixe ou mobile, dessin de presse,carricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **CAR 121 : Mathematics II**

➤ **Mathematics II: 4 credits (60 hours); L, T, SPW**

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

❖ **CAR 122 : Computer Science I**

➤ **Computer Science I: 5 credits (75 hours); L, T, P, SPW**

1. **General information and vocabulary**
 - Concept of information and computer;

- Resolution of the problems by the computer;
- Typology and computer configuration;
- Fields of application of the computer;
- 2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
- 3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
- 4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
- 5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
- 6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ **CAR 123 : Estimating, Calculating, Welding**

➤ **Estimating, Calculating, Welding: 5 credits (75 hours); L, T, P, SPW**

1. **Trade Calculation**
 - Add, subtract, multiply, and divide whole numbers, exponents, square-roots and use order of operations when applying these operations to trade related problems.
 - Define:
 - Proper and improper fractions
 - Mixed numbers
 - Lowest common denominator and brackets
 - Add, subtract, multiply, and divide fractions in Imperial measurement applications.
 - Add, subtract, multiply, and divide decimals in metric applications, using the concepts of :

- Rounding up of decimals,
 - Conversion of decimals to fractions and vice versa, and equivalent tables
 - Convert linear, area, volume, weight/mass measurements from Imperial to Metric and vice versa.
 - State and apply the Pythagorean Theorem to right angle triangles using the operations of squaring numbers and finding the square root of numbers, both by estimation and calculation.
 - Explain the concept of area and square units. Calculate the areas of common and complex shapes in the trade.
 - Explain the concept of volume and cubic units. Calculate the volumes of common and complex objects.
 - Explain the concepts of similar triangles and ratio & proportion as applied to carpentry.
 - Calculate simple and compound interest and percentage increase and decrease.
2. **Construction Layout Principles**
- . Identify and apply basic geometrical procedures to layout
3. **Basic Oxy-Acetylene & Shielded Metal Arc Welding**
- Identify oxy-acetylene gases and equipment such as cylinders, valves, regulators, manifolds, torches, tips, and lighters.
 - Interpret and apply safety practices related to:
 - Personal deportment in the welding shop
 - Protective Equipment - welding gloves, goggles, helmets, filter & cover lenses, safety footwear, aprons, etc.
 - Cylinder care - moving, lifting, securing, safety devices, construction and operation of valves, methods of detecting leakages, etc.
 - Hose care - testing for leakages, methods of repairing, colour codes, hose connection
 - Arc welding equipment – site set-up, ventilation, toxic fumes, arc radiation, etc.
 - Oxy-acetylene – site set-up, equipment, flame adjustment, lighting procedures, material handling, etc.
 - Define common welding and joining processes such as arc, flux-core, etc.
 - Explain oxy-acetylene cutting principles used in common practice
 - Recognize types, causes, and methods of controlling distortion due to metal expansion and contraction
 - Identify the parts and operating principles of basic power sources such as transformers, circuits, AC/DC input/output, polarity, amperage/duty cycle, cables & connectors, electrode, holders, and grounding

❖ **CAR 124 : Residential Construction I**

➤ **Residential Construction I: 4 credits (60 hours); L, T, P, SPW**

1. Building Layout

- Identify permits and locations required
- Identify site conditions affecting building location and elevation such as easements, services, adjacent buildings, safety requirements, grades, and type and size of building in question
- Locate lot lines and establish building lines using stakes and diagonal measurement for square
- Locate, build, and erect batter boards after determining off-sets and working clearance

2. Excavation

- Determine factors affecting depth of excavation such as foundation type, frost-line, depth of services, surrounding grade, and Ontario Building Code (O.B.C.) requirements
- Determine requirements of shoring and/or sloping of excavation sites depending on adjacent foundations, soil types, excavation depth, and the O.H.S.A
- Establish the best location for excavated material based on access to excavation, incoming services, backfilling, and grading
- Identify procedures required to excavate for renovations

3. Footing

- Identify O.B.C. requirements for different soil types and bearing capabilities
- Calculate strip and column footing dimensions according to O.B.C.
- Identify construction techniques for placing footing forms in excavations
- Identify stepped footings and bulkheads required for elevation changes as per O.B.C.
- Identify procedures for altering existing structures to accommodate renovations

4. Foundations

- Identify and compare the different types of foundation walls such as poured concrete, piers, screw piles, concrete block, PWF, ICF, and other innovations
- Identify and select the size requirements for all foundation walls based on O.B.C. requirements
- Identify damp-proofing and waterproofing requirements for all types of foundation walls
- Determine requirements for backfilling and grading based on O.B.C. requirements

- Identify procedures for altering existing structures to accommodate renovations
- 5. **Drainage System**
 - Identify the function and location requirements for drainage systems such as tile/pipe, drainage layers, sewers, sump pits, drainage ditches, soil gas venting and dry wells as per O.B.C. requirements
 - Identify the causes of hydrostatic forces and capillary action
 - Identify storm water management requirements
 - Identify procedures to accommodate drainage systems for renovations
- 6. **Floor Beams**
 - Describe the basic principles of beam design and factors affecting beam size such as clear span, supported joist length, loads and forces
 - Identify and compare beam types and characteristics such as steel, L.V.L., Glulam, P.S.L., box beam, built-up, solid wood, etc.
 - Identify beam bearing requirements as per O.B.C.
 - Determine beam size according to O.B.C. tables and manufacturers' charts
 - Identify construction methods and requirements for beams considering crowns; location of joints, and size, spacing and number of fasteners
 - Identify procedures for altering existing structures to accommodate renovations
- 7. **Columns**
 - Identify masonry, steel and wood columns and their appropriate application
 - Determine size of columns, based on load, height, and location, according to O.B.C.
 - Identify methods of securing columns at top and at bottom
 - Determine load bearing requirements for columns

❖ **CAR 125 : Floor System / Wall And Ceiling Framing**

➤ **Floor System / Wall And Ceiling Framing: 4 credits (60 hours); L, T, P, SPW**

1. **Floor System**

- Identify floor system components by type, size, function, method of installation, and related material with specific reference to the O.B.C. and other applicable span tables
 - Joist types (solid wood, T wood ", web, steel, etc.)
 - Joist sizes (span tables, depth & spacing)
 - Joist restraint (bridging, blocking, strapping) Cantilevered joists;
 - Outdoor joists Subfloor (types of materials including concrete toppings, thickness, fasteners)
- Identify floor openings such as fireplaces, chimneys, stairwells, chases, etc.

- Identify material, methods, and O.B.C. requirements for securing joists to sill plates, bearing walls, ledgers and beams
- Layout and install a floor system with openings, joist restraints and sheathing

2. **Wall Framing**

- Identify all types and components of wall framing systems including platform, balloon, post& beam, double stud, steel and manufactured.
- Calculate rough stud openings for exterior doors and windows and determine framing sequence and nailing schedule from O.B.C.
- Determine lintel sizes from O.B.C. tables and identify different methods for their assembly and installation. In addition, determine equivalent engineered product lintel sizes from manufacturers' tables.
- Determine framing and nailing requirements for interior partitions including R.S.O.'s for slab doors, bifolds, sliding bypass doors, and pocket doors.
- Identify diagonal bracing and fastening requirements per O.B.C. for stud walls including different types of structural and non-structural wall sheathing, wood let-in braces, metal "T" braces, diagonal stud bracing, and structural siding.
- Identify the general O.B.C. requirements for backing, blocking, and fire stops and those specific to creating a barrier free residence such as backing, rough opening, swing radius, square footage, minimum clearances, etc.
- Identify the requirements for back framing such as valances, drop ceilings, bulkheads, utility chases, etc.
- Layout and construct standard and rake stud walls (interior & exterior), complete with door and window openings, exterior corners, interior junctions, diagonal bracing, lapped double top plates, and application of sheathing, insulation, air and vapor barriers.
- Identify procedures for altering existing structures to accommodate renovations; this includes temporary load bearing walls and bracing.

3. **Ceiling Framing**

- Identify the purpose, location, and method of installation of ceiling joists
- Determine the size and spacing of ceiling joists according to O.B.C.
- Identify special ceiling considerations such as openings, vaults, etc.
- Layout and cut ceiling joists to suit various roof types
- Identify procedures for altering existing structures to accommodate renovations

❖ **CAR 126 : Equal And Unequal Lope Roofs (Roof Foundation)**

➤ **Equal And Unequal Lope Roofs (Roof Foundation) : 5 credits (75 hours); L, T, P, SPW**

1. Identify the different types of roofs and roof structural members such as rafters and intermediate supports.
2. Identify the special characteristics of roofs constructed with steel and I-joists
3. Calculate the lengths of all the different types of rafters using the rafter square tables and Pythagorean Theorem.
4. Determine rafter length adjustments and angle cuts including bird's mouth, shortenings, droppings, backings, and side/cheek cuts.
5. Layout rafters using several different methods including step-off methods, line length calculations, the speed square, the framing square, and full scale method.
6. Determine, layout and construct equal slope, dormers, gable, hip, and intersecting roofs.
7. Determine layout, cut and construct rafters, offsets, and raised wall plates for unequal slope roofs.
8. Determine layout, and cut sheathing face and edge cuts.
9. Identify procedures for altering existing structures to accommodate renovations

❖ **CAR 127 : Creation of company and Civic and Moral Education**

➤ **Entrepreneurship: 1 credits (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of a company

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ **CAR 231 : Mathematics III**

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ **CAR 232 : Physics and Chemistry II**

➤ **Physics III : 3 credits (45 hours); L, T, P**

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - The spread of heat.
2. **Electrodynamics and applications**
 - Currents and fields;
 - Production of magnetic fields;
 - The phenomenon of induction;
 - Alternating current;
 - Electromagnetic waves.

➤ **Chemistry: Basics of Quality, Health, Safety and Environment: 2 credits (30 hours); L, T, P**

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement.

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;
- Implement a prevention plan or emergency plan in its area of intervention.

4. Regulations and technical standards.

- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
- Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
- Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
- Apply ATEX regulations related to the control of risks related to explosive atmospheres;
- Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **CAR 233 : Trusses/ Interior and Exterior Finishing /Building Envelop**

➤ **Trusses/ Interior and Exterior Finishing /Building Envelop: 5 credits (75 hours); L, T, P, SPW**

1. Trusses

- Identify components and properties of prefabricated trusses or trussed rafters (wood and steel).

- Determine required layout, handling, and installation requirements for trussed roofs.
- Layout and install a complete roof truss system incorporating gable and hip truss systems
- Identify procedures for altering existing structures to accommodate renovations

2. **Exterior Finishing**

- Identify window styles, types and components
- Install a window/exterior door plumb and level in a rough stud opening with accepted clearances
- Identify various types of roofing material such as asphalt, wood, steel, tile, etc.
- Identify various flashings, water control accessories and building envelop requirements
- Identify the O.B.C. requirements with regard to the application of all finishing
- Layout and install asphalt shingles, wood shingles, flashing and water control according to manufacturers' specifications
- Identify and install cornices and cornice finishing materials
- Identify installation techniques for types of siding such as wood, aluminum, vinyl, etc.

3. **Interior Finishing**

- Identify pre-installation requirements for gypsum and non-gypsum wall and ceiling finishing
- Identify typical trims and their installation methods
- Identify various types of interior doors such as frame and panel, slab, bifold, bypass and pocket
- Identify door hardware such as passage set/lock set, closers and dead bolt
- Install an interior door with jamb, trim, and hardware such as passage set/lock
- Install window trim including stool, apron, and jamb extensions
- Install horizontal trim such as base, chair rail and crown
- Identify and determine installation and O.B.C. requirements for various floor coverings such as underlay, hardwood, tile, and resilient floor
- Identify, install and adjust upper & lower modular cabinet units
- Identify and install countertops
- Identify procedures to remove interior finishing using controlled procedures to accommodate renovations
- Describe methods to protect existing finishing to accommodate renovations

4. Building Envelope

- State the basic principles of building science that are at work in the building envelope and explain the importance of regulated indoor air quality and the meaning of the phrase 'the house as a system'
- Identify the components function of the building envelope
- Identify penetrations to the building envelope and methods to seal those penetrations or other areas of concern
- Identify trends in building science such as energy efficiency, indoor air quality and environmental impact
- Identify procedures to accommodate renovations

❖ CAR 234 : Plans, Specifications And Codes II (PSC)

➤ Plans, Specifications And Codes II (PSC) : 4 credits (60 hours); L, T, SPW

1. PSC For Residential Construction

- Read and interpret typical residential drawings and specifications with reference to:
 - Plot plans
 - Basement plans
 - Floor plans
 - Elevations
 - Sections
 - Detail drawings
 - Roof plans
 - Door schedule
 - Window schedules
 - Room finishing schedules
 - Architectural specifications
 - Plumbing, heating and electrical symbols

2. Estimating, Calculation And Layout

- State the industry accepted standards regarding time allotted for task completion in terms of carpenter hours per unit measurement and demonstrate the Theory and basic principles of estimating.
- Estimate, using linear, area, and volume measurements, the material quantities and related costs of:
 - Foundations
 - site requirements
 - floor framing
 - wall framing
 - roof framing
 - roof covering
 - window and doors

- insulation
- exterior weather barriers
- interior air vapor barriers
- exterior finishing
- interior finishing
- stairs
- cabinetry
- floor covering

❖ CAR 235 : Layout II- Transit And Level:Excavation, Shoring and Re-Shoring/ Footing and Deep Foundations

➤ Layout II- Transit And Level:Excavation, Shoring and Re-Shoring/ Footing and Deep Foundations : 5 credits (75 hours); L, T, P, SPW

1. Layout II- Transit And Level

- Identify types of layout instruments and related terminology
- Calculate and track changes in elevations and angles
- Select and use appropriate leveling instruments (on site) to establish elevations and level and plumb lines
- Select and use appropriate instruments such as a builder's level & laser level - for site and building layout
- Identify and describe the functions of advanced layout instruments such as total stations and theodolites

2. Excavation

- State the Occupational Health & Safety Act's (O.H.S.A.) regulations regarding trenching and shoring
- Identify types of shoring, and piles
- Identify hazards related to excavation, shoring and re-shoring including underpinning of adjacent buildings
- Identify re-shoring procedures to accommodate renovations

3. Footing And Deep Foundations

- Identify types of footing used in commercial construction such as spread, piles, caissons, piers, etc.
- Layout, cut and assemble footing forms.
- Identify procedures for altering existing structures to accommodate renovations.

❖ CAR 236 : Formwork & Concrete Structure

➤ Formwork & Concrete Structure: 4 credits (60 hours); L, T, P, SPW

1. Identify types of walls, columns, slabs, and girder used in commercial construction
2. Identify O.H.S.A.'s regulations regarding formwork and false work

3. Describe the composition and properties of various types of concrete
4. Describe the proper delivery, placement, consolidation and curing of concrete and describe testing methods
5. Identify and describe the factors affecting form design
6. Identify and describe formwork for concrete walls, slabs, stairs, beams and columns
7. Identify and describe ICF systems for commercial use
8. Identify methods used to connect structures to concrete
9. Identify and describe uses and placement of concrete-embedded steel
10. Construct and install templates for anchor bolts
11. Erect formwork for concrete walls, slabs, stairs, beams and columns, including ICF, loose forms and pre-manufactured forming systems

❖ **CAR 237 : Methodology of drafting the internship report / LAW**

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. **General Approach**
 - Nature and contents of internship report;
 - Paragraph;
 - The style and spelling.
2. **Structuring of the document**
 - Cover;
 - Acknowledgments;
 - Heading of the probation report;
 - Executive Summary;
 - List of figures and tables;
 - Glossary;
 - Body of the report of internship;
 - Bibliography;
 - Annexes;
 - Summaries and keywords.

B. Formatting of the probation report

1. **General information**
 - Remission of the probationary report;
 - Choice of software.
2. **Rules of presentation**
 - Size of the probation report;
 - Page layout;
 - Families of fonts;

- Sizes and styles of fonts;
- Spacings and pagination.
- 3. **Notes at the bottom of the page**
- 4. **Floater**
 - Tables;
 - Figures;
 - List of figures and tables;
 - Equations;
 - Glossary.
- 5. **Bibliography**
 - Purpose of the bibliographical quotations;
 - Format of bibliographical quotations; pop-up
 - List of bibliographical references;
 - Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ **CAR 241 : Statistics**

➤ **Statistics: 4 credits (60 hours); L, T, SPW**

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ **CAR 242 : Computer Science II / BQHHSE**

➤ **Computer Science II : 5 credits (75 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**

- Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
- Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ **CAR 243 : Interior And Exterior Finishing II**

➤ **Interior And Exterior Finishing II : 4 credits (60 hours); L, T, P, SPW**

1. **Interior finishing**
 - Identify and describe the tools, materials required for metal stud, suspended ceiling, and drywall installations
 - Identify and describe various types of demountable partitions
 - Layout and install suspended ceilings and metal stud walls complete with drywall ready for taping- using adhesives, screws or nailing – door frames, doors, bulkheads and chases
 - Identify and follow manufacturer's instructions to install various types of commercial hardware such as mortise lock, exit devices, closers, and handicap access hardware
 - Identify and describe materials and installation techniques used for fire ratings and sound attenuation ratings (STC) as applied to commercial buildings
2. **Exterior finishing**
 - Identify commercial exterior finishing such as aluminum, vinyl, wood, steel, composite products, concrete, flashings, cladding, brick mould, EIFS, CMU, curtain wall, precast
 - Identify procedures for altering existing structures to accommodate renovations

❖ **CAR 244 : Stairs & Ramps / Timber Construction**

➤ **Stairs & Ramps : 3 credits (45 hours); L, T, P, SPW**

1. Name and identify all stair components and terminology
2. Apply the Ontario Building Code to all types of stairs
3. Calculate and design stairs and suitable stairwell openings
4. Layout and construct stairs that include cut, housed and mitred stringers
5. Layout and construct a 3 step winder
6. Layout and install handrails, balusters, and newel posts

7. Identify and describe requirements for barrier free access ramps with reference to O.B.C
8. Layout a barrier free access ramp

➤ **Timber Construction : 2 credits (30 hours); L, T, P, SPW**

1. Identify the components and methods of construction of Post & Beam, mechanically connected and traditional timber frame
2. Layout and construct a traditional timber frame structure

❖ CAR 245 : Plans, Specifications and Codes/ Estimating Calculation & Layout

➤ **Plans, Specifications and Codes/ Estimating Calculation & Layout : 3 credits (45 hours); L, T, P, SPW**

1. **Ici Plans, Specifications and Codes**

- Read and interpret Architectural plans, specifications and shop drawings .
- Read and interpret engineered plans, specifications and shop drawings with reference to:
 - Scaffolding
 - Formwork
 - Trenching
 - Structural steel construction
 - Reinforced concrete structures
 - Electrical drawings
 - Mechanical drawings

2. **Ici Estimating, Calculation & Layout**

- State the industry accepted standards regarding time allotted for task completion in terms of carpenter hours per unit measurement and demonstrate the Theory: and basic principles of estimating.
- Estimate, using linear, area, and volume measurements, the material quantities of:
 - Interior finishing
 - Concrete volumes with related components
 - Formwork and false work
 - Roof details such as parapets, curbs and sleepers,
 - Temporary safety components such as guard rails, barricades, ramps, stairs, hoarding, etc

❖ CAR 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 Internship journal
4. Choice of the theme of work in collaboration with the professional trainer and the academic supervisor
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

❖ **CAR 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**
 - Definition;
 - Accounting registration;
 - Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
2. **Study of the structure of the balance sheet**
 - Calculations of ratios.
3. **Functional analysis of the balance sheet**
 - Definition;
 - Principles;

- Computations;
- Table of differential exploitation.
- 4. **Differential analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.

C. Analytical management accounting

1. **Generality on the cage**
 - Objective;
 - Role;
 - Concept of burden.
2. **Analysis of expenses**
 - Liable burden
 - Direct and indirect expenses;
 - Valorization of stocks.
3. **Method of full costs**
 - Cost of purchase;
 - Cost of production;
 - Cost of returns;
 - Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. **Notions of general economics**
 - Introduction;
 - Consumption and production;
 - The raising of income;
 - The currency and credit;
 - The prices;
 - The concept of growth and development.
2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.

4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

Field : CIVIL ENGINEERING

Specialty :

WOOD WORKS

Option :

JOINERY AND CABINET MAKING

FIELD :**CIVIL ENGINEERING**

Specialty:

Wood works

Option:

Joinery and Cabinetmaking

1. The objective of the training

This specialty has as objective to train senior technicians capable of developing and industrializing wood-based products and solving technical problems related to their implementation. They exercise their occupation in the workshop or on site, as well as in new construction and rehabilitation sites or both. They work the wood, its derivatives and associated materials (aluminum, glass products, and plastics).

2. Expected skills

→ General skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the carpentry sectors.

→ Specific skills

- Resolve technical problems related to the implementation of the wood and its derivatives;
- Participate in the studies necessary for industrialization and ensure the missions such as the management of production, organization and planning, the management and the improvement of quality, the valorization of human resources in production;
- Realize the joinery of building (stairs, closures, partitions, floor coverings, wall coverings...), the layout (stores, bathrooms...), the interior (furniture, cupboards...) and urban furniture (kiosks, playing grounds...).

3. Career opportunities

- Arranger of kitchens and bathrooms;
- Person in charge of sawmill;
- Person in charge of scheduling;
- Technician in the manufacture of furniture and joinery;
- Quality assistant

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Wood Works Option: Joinery and Cabinetmaking					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
JOC111	Mathematics I	30	20	5	5	60	4
JOC112	Statics / computer Science I	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
JOC113	Design and Style I	35	15	5	5	60	4
JOC114	Botany and anatomy	30	20	5	5	60	4
JOC115	Management of Operations and scaling	40	30	15	5	90	6
JOC116	Computer AssistedDrawing (CAD)	25	25	5	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
JOC117	Bilingual Training	20	15	10	0	45	3
Total		220	145	55	30	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Wood Works Option: Joinery and Cabinetmaking					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
JOC121	Mathematics II	30	25	0	5	60	4
JOC122	Physics and Chemistry I	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
JOC123	Physical properties of the wood	30	20	10	0	60	4
JOC124	strength of Materials	30	10	0	5	45	3
JOC125	Manufacturing processes / drying and preservation of wood	40	25	20	5	90	6
JOC126	Synthesis of practical I	40	20	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
JOC127	Creation of company and civic and moral education	30	10	0	5	45	3
Total		240	130	50	30	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Wood Works Option: Joinery and Cabinetmaking					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
JOC231	Mathematics III	35	10	10	5	60	4
JOC232	Physics and Chemistry II	35	25	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
JOC233	Analysis of manufacturing and framing	40	15	15	5	75	5
JOC234	Design and Style II	25	10	5	5	45	3
JOC235	Treatment and Wood Preservation	30	15	10	5	60	4
JOC236	Synthesis of practical II	40	30	15	5	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
JOC237	Methodology of drafting ofinternship report /LAW	30	10	0	5	45	3
Total		235	115	65	35	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Wood Works Option: Joinery and Cabinetmaking					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
JOC241	Statistics	35	20	0	5	60	4
JOC242	Computer Science II/ BQHHSE	35	25	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
JOC243	Finishing Processes	25	10	5	5	45	3
JOC244	Sawing	40	25	20	5	90	6
JOC245	Forestry regulation	30	10	0	5	45	3
JOC246	Professional internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
JOC247	Accounting and Economics	20	10	10	5	45	3
Total		185	100	105	60	450	30

5. Course contents

❖ JOC 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ JOC 112 : Statics /Computer Science I

➤ Statics : 2 credits (30hours); L, T, P, SPW

1. The fundamental principles of equilibrium
2. The laws of friction
3. Elements of grapho-statics
4. The triangulated systems

➤ Computer Science I: 3 credits (45 hours); L, T, P, SPW

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Circuits of calculations & memory;
 - Presentation and differences between digital & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, input and output Units);
 - Architecture and performance of microprocessors;
 - Programming a micro-computer (programming binary, hexadecimal, of assembling and evolved languages);
 - Presentation and roles of programs; their applications.

4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The systems of applications;
 - The programs of applications.
5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ JOC 113 : Drawing and style I

➤ drawing style I: 4 credits (60 hours); L, T, P, SPW

1. Drawing instruments, isometric perspective and stapler
2. The auxiliary views
3. Connections
4. Cuts and sections
5. Sketching of circle, triangles, pentagons, trapezoids, rounded corners, ellipses, irregular curves
6. Elaboration of sketches
7. Implementation of cutting plans and assembling drawing
8. Search for the true size of parts using the lowering method
9. Change of plan and rotation

❖ JOC 114 : Botany and anatomy

➤ Botany and anatomy: 4 credits (60 hours); L, T, P, SPW

1. Botany and wood anatomy
2. The forest and trees
3. The trees and their wood
4. The formation of wood
5. Systematics and dendrology
6. Systematic and dendrology
7. The objectives of anatomy (wood engraving)
8. The woody parts and humidity of woods

❖ JOC 115 : Management of operations and scaling

➤ Management of operations and scaling: 3 credits (45 hours); L, T, P, SPW

1. The company
2. The function of production

3. Organization of structures and types of production
4. The organization of work
5. The workshops
6. The setting up and handling
7. Scheduling- launching
8. The prior arts
9. Technique of sequencing
10. Basic concept of stocks
11. Process of output of goods
12. Evaluation of stocks

➤ **Scaling of logs : 3 credits (45 hours); L, T, P, SPW**

1. Measurement of dimensions
2. Documents of scaling
3. Evaluation of the volume of a log
4. Evaluation of the volume of the sawn up
5. Scaling of the flitches and sawn logs
6. Scaling of faults and assessment of volumes
7. Measurement of woodstacks

❖ **JOC 116 : Computer Assisted Drawing (CAD)**

➤ **Computer Assisted Drawing (CAD): 4 credits (60 hours); L, T, P, SPW**

1. Reminder on the essential commands of Windows operating system
2. Presentation of the Autocad interface and starting of the software
3. Study of the coordinate systems (absolute, relative and polar)
4. Study of the drawing tools bars and parameterization of Autocad
5. Study of the tools of creation of objects or entities
6. Editing a drawing
7. Creation, insertion of layers of lines and attribute of blocks
8. Dimensional and geometrical rating of drawing
9. Application on definition and whole drawings
10. Isometric projection
11. Creation of line layers and printing
12. Rapid methods of drawing on 2D
13. Design of the assembling elements
14. Rapid methods of whole drawing
15. Control of 3D drawing
16. Editing Command of 3D drawing
17. Rapid methods of 3D drawing

❖ JOC 117 : Bilingual training

➤ English: 1.5 credits (22 hours 30mn)

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
- How to introduce oneself

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;
- Lettre / memo writing and minutes of a meeting

➤ French : 1.5 credits (22 hours 30mn)

1. Vocabulaire

- Vocabulaire technique usuel

2. Grammaire

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ JOC 121 : Computer Science I

➤ Mathematics II: 4 credits (60 hours); L, T, SPW

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

❖ JOC 122 : Physics and Chemistry I

➤ Physics I: 2 credits (30 hours); L, T, P

Mechanics

1. Kinematics

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. Action of forces on a material point

- Principle of inertia and fundamental principle of dynamics;

- The superposition of forces;
 - The forces of inertia;
 - Friction and frictional forces.
3. **Gravitation**
- The force of gravity;
 - Law of gravitation;
 - Fields of forces.
4. **Work, power, energy and momentum**
- Work;
 - Power;
 - Energie;
 - Momentum
5. **Action of the forces on a solid body**
- Statics;
 - Kinetics of solid bodies.
6. **Fluid Mechanics**
- Fluid and gas at rest;
 - The flow of incompressible liquid.

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

1. **Nuclear Reactions**
- Describe the structure of a nucleus (Mass number, atomic number).
 - Characterization of isotopes;
 - Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
 - Establish the equation of a radioactive transformation;
 - Assess the fault of mass and the energy released by a nuclear reaction;
 - Half-life of the radioactive decay;
 - Activity of radioactive isotopes;
 - Radiation protection;
 - Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.
2. **Pure body and mixtures**
- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
 - Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
 - Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
 - Distinguish between the molar concentration of the normality;

- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. **Chemical reactions**

- Electronic structure of an atom;
- Bonding (ionic and covalent bonds);
- Molecular model of Lewis;
- Establish an equation of reaction;
- Establish a molar balance sheet;
- Standard enthalpy of reaction;
- Exothermic and endothermic reactions;
- Chemical equilibrium of reaction: Equilibrium constant;

4. **Speed of chemical reaction**

- Set the speed of a reaction by report to a reagent or product ;
- Define the constant speed;
- Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
- Define the Time of half-reaction;
- Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
- Explain the role of a catalyst;
- Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.

5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**

- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
- Oxidation, reduction, torque acido-basic, redox couple;
- Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
- Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;

- Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactionsacido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ JOC 123 : Physical properties of wood

➤ Physical properties of wood: 4 credits (60 hours); L, T, P

1. Definition,
2. Type of density
3. Calculation of the density of wood
4. Measuresaffecting the density
5. Color, appearance and grain of wood
6. Moisture content of wood and calculation
7. Relative measures
8. Hygroscopicity of wood
9. The units of measurement
10. Heat
11. The specific heat of woody material
12. The heat required for heating wood
13. Definition and type of electricity
14. Wood andcurrent
15. Factor affecting the resistivity of wood
16. Sound andwood
17. The resonance ofwood
18. The acoustic properties of wood and exercises
19. Light and wood
20. The mechanical properties of the wood (bending, traction, compression.)

❖ JOC 124 : Strength of Materials

➤ Resistance of Materials: 3 credits (45 hours); L, T, SPW

1. General: Theory of Beams
2. Geometrical characteristics of plane sections
3. Bucklingss
4. Simple solicitations
5. Bending: interior efforts

❖ JOC 125 : Manufacturing processes / Drying and preservation of wood

➤ Manufacturing processes: 3 credits (45 hours); L, T, P, SPW

1. **The tools**
 - The drilling
 - The tightening
2. **Techniques of construction of structures**
 - Assembling
 - Definition and combinatorialanalysis
 - Criterion of choice and conditions to be fulfilled
3. **Illustration of the different assembling types.**
 - Built in small and large frame
4. **Assembly in axle stake and rack**
 - Design and construction of drawers
5. **Construction of doors and shutters**
6. **The Hardware store**
 - General information
 - The assemblingelements
 - The elements of rotation
7. **The stand stillelements**

➤ Drying and preservation of wood: 3 credits (45 hours); L, T, P, SPW

1. Anatomy and hygroscopicity of wood
2. The moisture in the air
3. The fundamental principles of the drying of wood
4. Dryingdefects
5. The differentdryingprocesses
6. Calculation of the cost of drying

❖ JOC 126 : Synthesis of practical I

➤ Synthesis of practical I: 5 credits (75 hours); L, T, P, SPW

1. Description and use of the main machines of joinery: radial, circular and ribbon saw
2. The planers and drillers
3. The planers
4. The mortise and tenons
5. The shaping machines and sander...

❖ JOC 127 : Creation of Company and civic and moral education

➤ Creation of company:1 credit (15 hours); L, T, SPW

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of a company

➤ Civic and Moral Education: 2 credits (30 hours); L, T

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ JOC 231 : Mathematics III

➤ Mathematics III : 4 credits (60 hours); L, T, SPW

1. Linear Systems
2. Complex numbers
3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ JOC 232 : Physics and Chemistry II

➤ Physics II: 4 credits (60 hours); L, T, P, SPW

1. **Thermodynamics**
 - Temperature and thermal expansion;
 - Heat and fundamental principle of thermodynamics;
 - Change of state of ideal gases;
 - Kinetic theory of heat;
 - Cyclic process: second fundamental principle of thermodynamics;
 - Change of state;
 - The spread of heat.
2. **Electrodynamics and applications**
 - Currents and fields;
 - Production of magnetic fields;
 - The phenomenon of induction;
 - Alternating current;
 - Electromagnetic waves.

➤ Chemistry: Basics of Quality, Health, Safety and Environment : 2 credits (30 hours); L, T, P

1. **Management system of a company**
 - Identify the management system of a company using the global standards ISO 9001 and 14001;
 - Use and master the vocabulary of management systems.
2. **Fight against nonconformities and loop of continuous improvement.**
 - Use and master the vocabulary of continuous improvement;
 - Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
 - Identify nonconformities, their degree of severity and their consequences in any context;

- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
 - Respect the rules of traceability within the limits of its field of intervention.
3. **Risk analysis and prevention.**
- Participate in a risk prevention analysis;
 - Participate in a dynamic risk impact analysis;
 - Implement a prevention plan or emergency plan in its area of intervention.
4. **Regulations and technical standards.**
- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
 - Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
 - Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
 - Apply ATEX regulations related to the control of risks related to explosive atmospheres;
 - Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ JOC 233 : Analysis of manufacturing and framing

➤ Analysis of manufacturing : 2 credits (30 hours); L, T, P, SPW

1. Elaboration of the ranges of machining
2. Analysis of parameters of machining
3. Manufacturing of templates
4. Selection of the techniques of assembling
5. Preparation of documents used by the office of methods
6. Optimized exploitation of the working environment

➤ Framing: 3 credits (45 hours); L, T, P, SPW

1. The roof and its frame
2. The classical and modern trusses
3. The assemblies used in the frame
4. The calculation of the frames and assembly
5. Sizing of the attics and floor

❖ JOC 234 : Drawing and style II

➤ Drawing and style II: 3 credits (45 hours); L, T, P, SPW

1. Reminder of the preliminary concepts of design and style
2. Study of French styles of the 10th to the 20th century. (Gothic, Renaissance, Louis XIII, VIX, XV, XVI, ExecutiveBoard, Louis Philippe; restoration...)
3. Study of English styles. (Queen Ane, Chippendale, William and Merry, Tudor, help write, jacoben...)
4. The tapered prospects with a side and central point of leakage.
5. The tapered prospects with two points of leakage...

❖ JOC 235 : Treatment and wood preservation

➤ Treatment and Wood Preservation: 4 credits (60 hours); L, T, P, SPW

1. The preservation and treatment of wood (generalities)
2. The protection of logs
3. The temporary protection of fresh sawing and veneer
4. The protection of woodworks
5. The agents of degradation of wood
6. The processingproducts
7. The treatmentprocesses

❖ JOC 236 : Synthesis of practical II

➤ Synthesis of practical II: 6 credits (90 hours); L, T, SPW

1. Use of fixed and portable machinery
2. Design and manufacture of machining in view of a production in series
3. Machining and mounting of wooden structures

❖ JOC 237 : Methodology of drafting internship report / LAW

➤ Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW

A. Drafting and structuring of probation report

1. **General Approach**
 - Nature and contents of internship report;
 - Paragraph;
 - The style and spelling.
2. **Structuring of the document**
 - Cover;
 - Acknowledgments;

- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. General information

- Remission of the probationary report;
- Choice of software.

2. Rules of presentation

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. Notes at the bottom of the page

4. Floaters

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. Bibliography

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

➤ Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ JOC 241 : Statistics

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

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ JOC 242 : Computer Science II

➤ Computer Science II : 5credits (75 hours); L, T, P, SPW

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ JOC 243 : Finishing processes

➤ Finishing processes: 3 credits (45 hours); L, T, P, SPW

1. General history on finishing
2. The preparation of surfaces and study of abrasives
3. Study of sanding machines
4. Finishingproducts

❖ JOC 244 : Sawing

➤ Sawing: 6 credits (90 hours); L, T, P, SPW

❖ JOC 245 : Forest regulation

➤ Forest Regulations: 3 credits (45 hours); L, T, SPW

1. **General presentation of the texts in force.**
 - Presentation of the Forest Act
 - Presentation of the decree and a few ordinances relating to the forest of Cameroon
2. **The protection of nature.**
 - Biodiversity, clearing, bush fires, toxic waste, etc.
3. **The types of forests.**
 - The permanent forests
 - The non permanent forests
4. **Forest certification**
 - Conditions, files, the technical committee
5. **The inventory of forests.**
 - Definitions and types of inventories
 - The inventory of development
 - The inventory of exploitation
6. **The management of forests.**
 - Definitions and activities
 - The Forest Special Development Fund
 - The Annual Allowable logging
 - The development of permanent and local forests
7. **The logging.**
 - Definition
 - The exploitation of estate forests
 - The exploitation of community forests
 - The exploitation of non-permanent forests
8. **The tax provisions**
9. **The offenses**

❖ JOC 246 : Professional internship

➤ Professional internship I: 6 credits (90 hours); P, SPW

1. Arrival and integration in the enterprise
2. Working in an enterprise
3. Holding of the Internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
5. Elaboration of the research outline
6. Resources to exploit

7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ JOC 247 : Accounting and Economics

➤ Accounting: 1 credit (15 hours); L, T, SPW

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**
 - Definition;
 - Accounting registration;
 - Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
2. **Study of the structure of the balance sheet**
 - Calculations of ratios.
3. **Functional analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.
4. **Differential analysis of the balance sheet**
 - Definition;
 - Principles;

- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. Generality on the cage

- Objective;
- Role;
- Concept of burden.

2. Analysis of expenses

- Liable burden
- Direct and indirect expenses;
- Valorization of stocks.

3. Method of full costs

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. Notions of general economics

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;
- The prices;
- The concept of growth and development.

2. The Company

- Introduction;
- Typology of enterprises;
- Structure and organization of the enterprise;
- The company and ethics;
- How to undertake (create, decide, manage).

3. The place of the company in the economic fabric

- Concept of the environment of the company;
- The inter- and extra-enterprises relationships;
- The commercial activity;
- The notion of strategy.

4. The productive activity

- The policies and processes of production;
- The trade policies;
- Logistics.

5. The concept of management in the company

- The activity and financial resources;

- The planning and management of human resources;
- The planning and the management of material resources.

6. **Information and Communication in the Enterprise**

- Role of information and communication;
- Collection and organization of information;
- Strategic diagnosis;
- Decision System

Field : CIVIL ENGINEERING

Specialty :

REAL ESTATE MAINTENANCE

1. The objective of the training

The Higher National Diploma in Quantity Surveying Programme is designed to produce Higher Technicians in the Building Industry.

2. Expected skills

→ Generic skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the real estate maintenance sectors.

→ Specific Skills

- Measure and prepare bills of quantities and contract documents for construction works;
- Prepare final accounts for construction projects;
- Measure all the constructed works;
- Extract and compile schedule of materials required for construction;
- Interpret contract documents of all types of construction;
- Prepare estimates for construction projects;
- Undertake feasibility studies for construction projects;
- Assist in valuing existing landed properties;
- Give cost advice to the designer/supervisor from inception to completion;
- Prepare budget and cash-flow for construction projects;
- Use computer for cost-related aspects of construction works.

3. Career opportunities

- Maintenance technician in municipal collectivity;
- Manager of facility site operation;
- Maintenance supervisor;
- Mobile building maintenance;
- Commercial and real estate facility;
- Operation and daily maintenance;
- Planned maintenance management;
- Installation management;
- Periodic supervision.

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Real Estate Maintenance					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
REM111	Mathematics I	30	20		10	60	4
REM112	Physics and chemistry I	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
REM113	Advanced Measurement of Construction Works I	25	20	10	5	60	4
REM114	Construction Economics I and Construction Management I	40	10	20	5	75	5
REM115	Construction Technology I	30	15	10	5	60	4
REM116	Architectural Design and Drawing	35	10	25	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
REM117	Bilingual Training	20	10	10	5	45	3
Total		190	95	105	60	450	30

• SECOND SEMESTER

Field: Civil Engineering		Specialty: Real Estate Maintenance					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
REM121	Mathematics II	30	15	10	5	60	4
REM122	Computer Science I	40	15	10	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
REM123	Advanced Measurement of Construction Works II	30	15	10	5	60	4
REM124	Construction Economics II and Construction Management II	40	10	20	5	75	5
REM125	Construction Technology II	30	15	10	5	60	4
REM126	Measurement of Civil Engineering Works I	30	10	10	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
REM127	Creation of Company and Civic and Moral Education	10	10	20	5	45	3
Total		170	75	160	45	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Real Estate Maintenance					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
REM231	Mathematics III	30	15	10	5	60	4
REM232	Physics and Chemistry II	30	15	20	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
REM233	Advanced Measurement of Construction Works III	30	15	20	10	75	5
REM234	Construction Economics III and Construction Technology III	40	10	20	5	75	5
REM235	Measurement of Civil Engineering Works II	25	15	10	10	60	4
REM236	Building Service and Maintenance courses	25	10	20	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
REM237	Methodology of drafting Internship Report /LAW	20	10	10	5	45	3
Total		180	90	125	55	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering		Specialty: Real Estate Maintenance					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
REM241	Statistics	30	15	10	5	60	4
REM242	Computer Science II	30	10	25	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
REM243	Advanced Measurement of Construction Works IV	30	15	10	5	60	4
REM244	Measurement of Heavy Engineering Works	20	10	10	5	45	3
REM245	Construction Technology IV/ Tendering and Estimating II	40	10	15	10	75	5
REM246	Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
REM247	Accounting and Economics	25	10	5	5	45	3
Total		160	75	145	70	450	30

5. Course Contents

❖ REM 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ REM 112 : Physics and Chemistry

➤ Physics I: 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;

- Kinetics of solid bodies.

6. **Fluid Mechanics**

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. **Nuclear Reactions**

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. **Pure body and mixtures**

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;
- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.

3. **Chemical reactions**

- Electronic structure of an atom;

- Bonding (ionic and covalent bonds);
 - Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
4. **Speed of chemical reaction**
- Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
- Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
6. **Organic chemistry**
- Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cycloalkanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;
 - Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
 - Distinguish monomer and polymer;
 - To distinguish the types of reactions of polymerization;
 - Describe the properties of a few industrial polymers.

❖ REM 113 : Advanced Measurement of Construction Works I

➤ Advanced Measurement of Construction Works I : 4 credits (60 hours); L, T, SPW

A- Theoretical Content

Know how to measure from drawings and by reference to specifications of more complex building construction

1. Measure substructure work for complex and special foundations.
2. Measure solid, suspended, ground floor slab and associated reinforcement and formwork
3. Measure walls of brickwork, block work of solid cavity and hollow nature, together with associated features.
4. Measure doors, windows and associated frames and iron mongery including adjustment for openings
5. Measure roof construction and roof covering, concrete roofs, steel trusses tiles, felt asbestos, corrugated sheet, lead, zinc, copper and aluminum.
6. Measure staircase timber, reinforced concrete including finishing.
7. Measure fittings and cupboard fixtures, shelving, skirting, architrave's picture rails, pelmets, dadoes etc.
8. Measure frames-structural steel, reinforced concrete beams.

B- Practical Content

1. Know how to read drawings for substructure work for complex and specification of more complex building construction of traditional class and simple industrial buildings of two stories.
2. Provide and read substructure drawing for complex and special foundations.
3. Prepare specification and schedules of suspended, ground floor slab of building drawings.
4. Prepare doors and windows schedules for a complex building.

❖ REM 114 : Construction Economics I and Construction Management I

➤ Construction Management I: 2 credits (30 hours); L, T, P, SPW

1. Define the management terms like planning, Organizing, staffing, controlling, 'coordinating, leadership etc.
2. Apply these terms to construction management.
3. Distinguish between various types of formal organization.
4. Explain predominant role of structure of different organization.
5. Characterize patterns involvement by people indifferent organizations.
6. Apply typical strategies used by different people.
7. Describe the principle characteristics of large, medium and small design partnerships

8. State the principal characteristic of large, medium and small construction company
9. Apply the principal characteristics of large, medium, and small construction site organisations.
10. Demonstrate the value of effective communicating roles and relationships between clearly identified job functions on building project.
11. Describe the conflicts that arise in interpersonal relationships between clearly identified job functions on building project.
12. Use effective methods of interviewing applicants for a job
13. Define span of control.
14. Demonstrate how span of control affects site organisation
15. Describe how delegation and accountability affect site organisation
16. Define objectives of an organization
17. Describe policy planning.
18. Determine the constraints.
19. Propose planning for a construction industry
20. Carryout case studies using the knowledge gained in above.

➤ **Construction Economics I: 3 credits (45 hours); L, T, P, SPW**

Theoretical Content

1. Factors which influence the cost of construction works.

- Explain the scope of construction economics.
- Define the terms:
 - Cost planning
 - Cost Control
 - Cost Limit
 - Cost Plan
 - Cost Analysis
 - Cost Target
- Apply these terms to construction works.

2. Techniques of cost Planning.

- Explain the role of the quantity surveyor during the design stages of
 - work as suggested in the plan of work for design team operation - e.g.
 - At feasibility stage.
 - At outline design stage.
 - Sketch design stage.
 - Detail design stage.
- State the purpose and use of cost planning.

- Describe the principles involved in preparation of cost analysis from bill of quantities.
- Use cost analysis for producing an approximate estimate.
- List factors which influence construction cost.
- Describe the influence of construction costs on:
 - Size
 - Shape
 - Storey heights
 - Function and fitness for purpose
 - Location and site considerations
 - Duration
 - Functional life of components
- Use the perimeter method to calculate how the cost of building will be influenced by: (i) Shape (ii) Size.

❖ REM 115 : Construction Technology I

➤ Construction Technology I: 4 credits (60 hours); L, T, P, SPW

Theoretical Content

1. **Different types of foundations that can be used in the Construction of large buildings, their methods of constructions and conditions for use.**
 - Describe excavation and basement construction.
 - Describe the construction of raft, pad, stepped, isolated. foundation in mass and reinforced concrete, cantilever foundations and pile foundations.
 - Identify the factors affecting the choice of foundations.
 - Select type of foundation to be used under different walls construction.
2. **Construction of different types of walls and the materials used in their construction.**
 - Describe the construction of load bearing walls, non-load bearing walls and certain walls using different materials, and cost construction.
 - Match different types of materials used in wall construction with different types of walls.
 - Identify different types of internal partitions including pre-formed and demountable partitions.
 - State traditional methods and modern prefabricated method of wall construction.
3. **Construction of different types of floor using different materials.**
 - Describe the construction of one-way and two-way spanning floors.
 - Describe the construction of ground, upper and raised floors.

- Identify timber, concrete and steel as materials used in floor construction and factors affecting their choice.
- 4. **Construction of stairs in timber, steel and concrete.**
 - Describe stair construction using timber, steel and concrete.
 - Identify the factors affecting the construction of internal and external stairs.
 - Identify the factors affecting choice of materials for different types of stairs.
 - Explain the formulae used in stair case design.

❖ **REM 116 : Architectural Design and Drawing**

➤ **Architectural Design and Drawing: 5 credits (75 hours); L, T, P, SPW**

Theoretical Content

1. **Know how to draw and interpret drawings.**
 - State the hierarchical order of the various spaces for a given Building type.
 - Explain the factors affecting the arrangement of these spaces.
 - Determine the sizes of the spaces.
2. **Know how to prepare design briefs.**
 - Enumerate the key ingredients of a good design brief.
 - Describe the process of gathering information for design brief preparation.
 - Articulate a proper presentation format for a good design brief.
 - Prepare a design brief for a given project.
 - Make appraisal of a given design brief with respect to an existing building. in relation to the executed project particularly in relation to cost benefit analysis.
3. **Understand the design process**
 - Describe the culture of the people around the locality of a given site for a chosen type of residential building design.
 - Explain the environmental and climatic determinants on the design.
 - Prepare preliminary sketch design based on a prepared design brief.
 - Make material specification for the design.
4. **Procedures for development and programming for a full scale drawing.**
 - Interpret a given preliminary sketch design.
 - Articulate the constituents of the working drawing and details to be done.
 - Choose size of drawing sheets and select overall dimensions
 - Identify significant details that should be produced.

- Produce the required working drawings and details with dimension and annotations.
5. **Understand the principle of modular coordination in draughting.**
- Define modular coordination.
 - Explain the basic methods in modular coordination.
 - Illustrate known modular draughting methods and conventions.
 - Illustrate the use of modular dimensioning in the assembling of component units in architectural working drawing.
 - Prepare architectural working drawing using modular draughting techniques for a given design.
 - Prepare modular details.
 - State the tolerance ranges for on - site lay-out of coordinates.
6. **Schedules and specifications.**
- Define schedules and specifications
 - Clarify the differences between schedules and specifications.
 - Articulate the key ingredients of good schedules and specifications.
 - Enumerate the various types of schedules used in project drawing.
 - Prepare the necessary schedules for the drawing of given building projects.
7. **Service drawing.**
- Describe service drawing.
 - Enumerate the various types of service drawing.
 - State the importance of service drawings in production drawings.
 - Articulate services lay-out for a simple residential project e.g. water supply system, drainage, sewage disposal, solid waste disposal, electricity supply and distribution, telecommunication network, etc.
 - Prepare necessary drawing with annotations and schedules for above.
8. **Working drawing detailing.**
- Explain the importance of detailing working drawing.
 - State the key ingredients in a good detail.
 - Produce working details for various foundation types such as strip, pad, raft and pile foundation.
 - Produce working details for various damp proofing systems in basement wall construction.
 - Produce details for various types of floor, wall and stair construction.
 - Produce details for various types of penetration works in building.
 - Produce details for various types of roof and ceiling construction.

Practical Content

1. Understand the design process
2. Prepare preliminary sketch design based on a prepared design brief

3. Make material specification for the design
4. Know the procedures for development and programming for full scale drawing
5. Choose size of drawing sheets and select overall dimensions
6. Identify significant details that should be produced.
7. Produce the required working drawing and details with dimension and annotations
8. Understand the principle of modular coordination in draughting
9. Prepare architectural working drawing using
10. Modular draughting techniques for a given design
11. Prepare modular details
12. Know schedules and specifications
13. Prepare the necessary schedules for given building project drawing
14. Know how to prepare service drawings
15. Prepare services lay-out for a simple residential project e.g. water supply system, drainage, sewage disposal, solid waste disposal, electricity supply and distribution, telecommunication network, etc.
16. Prepare necessary drawing with annotations and schedules for the above
17. Understand the working drawing detailing
18. Produce working details for various foundation types such as strip, pad, raft and pile foundation
19. Produce working details for various damp proofing systems in basement wall construction
20. Produce details for various types of floor, wall and stair construction
21. Produce details for various types of penetration works in building
22. Produce details for various types of roof and ceiling construction

❖ **REM 117 : Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
- How to introduce oneself
- 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;
 - Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**

- Vocabulaire technique usuel

2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...

- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ REM 121 : Mathematics II

➤ Mathematics II: 4 credits (60 hours); L, T, SPW

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transform
5. Fourier transform
6. Functions with several variables - scalar fields and vectors and some applications

❖ REM 122 : Computer Science I

➤ Computer Science I: 5 credits (75 hours); L, T, P, SPW

1. **General information and vocabulary**
 - Concept of information and computer;
 - Resolution of the problems by the computer;
 - Typology and computer configuration;
 - Fields of application of the computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculation circuits & memory;
 - Presentation and differences between digital data & non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers;
 - Functional units (Central Processing Unit, Units of input and output);
 - Architecture and performance of microprocessors;
 - Programme a micro-computer (binary, hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.

4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The application systems;
 - Application programs.
5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

❖ REM 123 : Advanced Measurement of Construction Works II

➤ **Advanced Measurement of Construction Works II: 4 credits (60 hours); L, T, P, SPW**

Theoretical Content

1. **Know how to measure drainage, service installations and external works**
 - Measure drainage - explanation pipe work, manholes, inspection chambers, soak away pits, septic tanks.
 - Measure water supply and sanitary appliances.
 - Measure external works, paths, roads, flower and tree planting, turfing, fencing and gates.
2. **Know how to prepare examples of different methods of processing dimensions, billing and preparing Schedules**
 - Process dimension - abstracting, cut and shuffle, direct billing.
 - Prepare different bill formats explaining their uses:-
 - Work section bill
 - Elemental bill
 - Sectionalized Trade bill
 - Operational bill
 - Activity bill
 - Prepare schedules for finishing, reinforcement, openings (doors and windows), ironmongery, sanitary appliances and drainage.

Practical Content

1. **To provide student with a practical knowledge of constructing working drawings**
 - Read drawings or pipe work, manholes, inspection chambers, soak away pits, septic tanks
 - Read drawings or work, paths, roads, fencing and gates

2. **Know how to prepare examples of different methods of processing dimensions, billing and preparing schedules**
 - Prepare schedules for finishing, reinforcement, openings (doors and windows, ironmongery, sanitary appliances and drainage of complex. Building

❖ **REM 124 : Construction Economics and Construction Management II**

➤ **Construction Management II : 2 credits (30 hours); L, T, P, SPW**

1. Describe an outline study of human reactions
2. State types of behavior in working environment
3. Analyse human behaviour in working environment
4. Define the work committee in management and how committees are set-up
5. Describe the work of committee and where they can best be used
6. Describe the ratification and implementation of the decision reached by the committee
7. Analyse the committee decision
8. State the objectives and advantages of programming
9. Explain different types of programming and where they can best be used-overall mastery
10. Schedule short term programme and weekly programme
11. Explain the use and application of network analysis e.g. Bar chart, C.P.M and PERT in construction project
12. Prepare Bar chart and network diagrams from given or deemed construction information
13. Illustrate the use of linear programming construction projects
14. Apply the linear programming to construction practice

➤ **Construction Economics II : 3 credits (45 hours); L, T, P, SPW**

Theoretical Content

1. **Knowledge on the distribution of cost in building**
 - Describe the principles involved in building up
 - State the uses of indices in pre contract work
 - State the uses of indices in post contract work
 - Carry out simple calculations involving the uses of indices e.g. updating of bill rates
2. **Effects of legislation on building development/cost.**
 - Explain the effect of legislation on building cost e.g.
 - Population density (with respect to estate)
 - Special installation in control of population e.g. in wood processing industry

- Special installations like lifts, fire fighting installations
 - Apply these legislation to construction practice
3. **Techniques used in investment appraisal**
- Define the term:
 - Development
 - Investment
 - Value
 - State the conceptual difference between value and cost
 - Describe the methods of determining value of property
 - Explain the purpose of developer's budget
 - Prepare developer's budget to determine:
 - Maximum expenditure for land (without exceeding the cost limit).
 - Maximum expenditure for building (without exceeding the cost limit)
 - Propose solutions where the maximum expenditure for land or building exceeds the anticipated expenditure
4. **Principles involved in establishing cost limit, their uses in controlling Costs during design**
- Establish cost limit from past project
 - Use cost limits in controlling cost
 - Prepare outline cost plan of simple building using square metre methods of estimating

❖ **REM 125 : Construction Technology II**

➤ **Construction Technology II : 4 credits (60 hours); L, T, P, SPW**

1. **Advance construction of medium and long span roofs.**
 - Describe the construction of flat and pitched roofs spacing up to 10 metres
 - Describe the use of galvanised iron sheets, corrugated asbestos sheets, aluminum sheets and roof tiles as roofing materials
 - Select the material in 1.2 above for construction purposes
 - Describe the method of fixing of the different types of roofing materials in 1.2 above
2. **Production of concrete and its placement.**
 - Describe the dry materials used in concrete production
 - Explain the factors affecting the mixture ratio of concrete
 - State quantities of dry materials
 - Batch proportion of materials
 - Outline principles of mixing concrete identifying water content mixing cycle, and introduction of admixtures
 - Describe various transportation and placing of concrete
 - Illustrate compaction of concrete using different methods
 - Describe:

- Plain concrete
 - Reinforced concrete
 - Pre-cast concrete
 - In-situ concrete
 - Pre-stressed concrete
 - Describe type and quality of reinforcement used in reinforced concrete, and method of placement
 - Explain the unit production in pre-cast concrete storage, handling and methods of fixing of pre-cast elements
 - Describe methods of pre-tensioning, posttensioning and types of equipment used
3. **The different types of doors and windows and their methods**
- Identify printed and sliding windows in composite materials, timber and in steel
 - Describe their methods of fixing
 - Identify sliding and folding types of doors
 - Describe their methods of fixing
4. **The different types of finishing as applied to large Building.**
- Identify different types of finishing as applied to walls, floor, stating the purpose each is supposed to serve
 - Describe different types of ceiling construction
 - Identify finishing as applied to each type

❖ **REM 126 : Measurement of Civil Engineering Works I**

➤ **Measurement of Civil Engineering Works I : 5 credits (75 hours); L, T, P, SPW**

Theoretical Content

1. Explain the arrangement and format of the CESMM
2. Analyse the sections in the CESMM
3. Explain the method of coding in the CESMM
4. Use the coding for Civil Engineering works
5. Explain the method of deriving bill
6. Explain method related charges
7. Identify the reason for providing for method related charges
8. State the advantages and disadvantages of method related charges
9. Write method related charges for inclusion in bill of quantities
10. Measure works under general items
11. Measure works under site investigation
12. Measure works under geotechnical and other specialist process
13. Measure works under demolition and site clearance

Practical content

1. Apply the section and coding in the CESMM in the measurement of the following :

- General items
 - Demolition and site clearance
 - Site investigation works
2. Write method related charges for inclusion in bills of quantities.

❖ **REM 127 : Creation of company and Civic and Moral Education**

➤ **Entrepreneurship: 1 credits (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of acompany

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

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

❖ **REM 231 : Mathematics III**

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers

3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ REM 232 : Physics and Chemistry II

➤ Physics III : 3 credits (45 hours); L, T, P

1. Thermodynamics

- Temperature and thermal expansion;
- Heat and fundamental principle of thermodynamics;
- Change of state of ideal gases;
- Kinetic theory of heat;
- Cyclic process: second fundamental principle of thermodynamics;
- Change of state;
- The spread of heat.

2. Electrodynamics and applications

- Currents and fields;
- Production of magnetic fields;
- The phenomenon of induction;
- Alternating current;
- Electromagnetic waves.

➤ Chemistry: Basics of Quality, Health, Safety and Environment: 2 credits (30 hours); L, T, P

1. Management system of a company

- Identify the management system of a company using the global standards ISO 9001 and 14001;
- Use and master the vocabulary of management systems.

2. Fight against nonconformities and loop of continuous improvement.

- Use and master the vocabulary of continuous improvement;
- Identify the implementation of the continuous improvement loop, regardless of the domain or company involved: ascertain, isolate / contain, analyze causes, treat causes, measure effectiveness;
- Identify nonconformities, their degree of severity and their consequences in any context;
- Propose corrective and preventive actions, even improvement, within the limits of its field of intervention;
- Respect the rules of traceability within the limits of its field of intervention.

3. Risk analysis and prevention.

- Participate in a risk prevention analysis;
- Participate in a dynamic risk impact analysis;

- Implement a prevention plan or emergency plan in its area of intervention.
4. **Regulations and technical standards.**
- Situate its action within the framework of the operational technical standards developed by the IEC TC 65: for example the IEC 61508, IEC 61326, IEC 62443, IEC 62424, IEC 62708 series, etc.
 - Recognize the pictograms, hazard classes and precautionary and prevention statements of the CLP Regulation;
 - Apply the rules of prevention, limitation or prohibition related to the REACH Regulation on substances and their uses, whether in the form of raw materials, in mixtures, or contained in "articles";
 - Apply ATEX regulations related to the control of risks related to explosive atmospheres;
 - Comply with the sorting instructions for end-of-life CIRA equipment, issued by the Waste Electrical and Electronic Equipment (WEEE) Directive.

❖ **REM 233 : Advanced Measurement of Construction Works III**

➤ **Advanced Measurement of Construction Works III: 5 credits (75 hours); L, T, P, SPW**

Theoretical Content

1. Measure substructure - special foundations e.g. driven and bored piling, sheet pilings underpinning, and grating foundations
2. Measure :
 - Prefabricated buildings
 - Industrial and system buildings.
 - Buildings constructed mainly of standardized components off - site.
3. Measure structural frames of precast concrete, timber and steel works.
4. Measure wall cladding and external finishing, pre-cast concrete, cast stone, curtain walls, etc.
5. Measure internal and external finishing - ceiling, wall and floor for finishing of a more complex nature including dismountable partition and suspended ceilings.
6. Measure works in domestic plumbing installation -cold/hot water installation, sanitary installation, rain water installation, etc. and associated appliances and builders works.

Practical Content

1. Prepare schedule from drawing for external finishing-ceiling, wall and floor finishing of a more complex nature including dismountable partition and suspended ceilings.

2. Read drawings or domestic plumbing, Installation-cold/hot water installation, sanitary installation, rain water installation, etc. and associated appliances and prepare schedules.

❖ REM 234 : Construction Economics III and Construction Technology III

➤ Construction Economics III : 3 credits (45 hours); L, T, P, SPW

1. **Application of cost indices, concept of cost limit, investment and cost plan as tools in controlling building costs**
 - Prepare elemental cost plan adjusting for price and other factors which influence the cost of building projects using building cost indices approach
 - Prepare graph of building costs and use this to forecast future cost trend
2. **Nature of costs and its effects on liquidity and profitability**
 - Describe the effect of change in the cost of inputs in a fixed price contract on the profits of a contractor.
 - Explain the different inventory costing systems
 - Show the effect of the above (2.2) mentioned systems on profit and replacement costs.
 - List the factors which influence financial fields on property.
3. **Use of discount cash-flow techniques for capital budgeting and the preparation of master budgets.**
 - Explain the concept of:
 - DCF techniques.
 - Time - value of money
 - Carry out calculations on discount cash flow techniques and give advice based on the results of the calculations
 - Draw graphs of:
 - Cost against Time
 - Cash out against Time
 - Money received against Time
 - Contract value against Time
 - Use the graph to determine:
 - Maximum amount required to finance a project
 - When the contract becomes self financing
 - Explain the tenure average payment delay
 - Explain what may be done to make a contract self financing.
4. **Use of cost-in-use techniques for project evaluation purposes.**
 - Explain the following terms:
 - Initial cost
 - Running cost

- Maintenance cost
- Cost - in - use
- Life cycle costing
- Carryout simple cost -in - use calculation to aid decision on:
 - Choice of alternative compound
 - Choice of type and layout of life installation
 - Choice of alternative decisions
- List sources of information for cost-in-use exercises
- Explain the merits and demerits of cost-in-use techniques.
- Draw sensitivity analysis graphs to show the effect in cost of:
 - Charge in interest
 - Charge in functional life of buildings.
- Use the graphs to make projections.

➤ **Construction Technology III : 2 credits (30 hours); L, T, P, SPW**

1. Prefabricated components and plant requirements

- Explain the development and use of prefabricated components and units
- Determine the plant requirements for handling and production
- Describe tolerance and jointing methods
- Describe portal frame, space frame, tension structures and air structures

2. Industrialized building systems and provision for services

- Describe industrialized building systems
- Determine the provision of services in industrialized building

3. Lifts and escalators.

- Differentiate between different kinds of lifts and escalators
- Design the installation of lifts and escalators
- Maintain lifts and escalators

4. Suspended ceilings.

- Describe suspended ceilings
- List services built in suspended ceilings

5. Selected aspects of civil engineering works.

- Describe different types of roads
- Outline materials used in construction of flexible and rigid pavement.
- Describe the parts of a standard road
- Explain grossed areas, boundary walls, fences, planted flowers, trees, and kerbs, etc.
- Interpret "ROAD NOTE 29" or any similar code of practice
- List the differences in earth, rigid, composite and flexible roads
- Describe with sketches joints in rigid pavements and bridges
- Explain how to carryout simple maintenance of roads

- Describe dams and bridges construction
- 6. **Statutory regulations**
 - Interpret statutory regulations
 - Vet building/architectural drawings using the knowledge of statutory regulations
 - Explain public health act, town and country planning act, building regulations and factory act
 - Ensure that buildings are erected in compliance with statutory regulations

❖ **REM 235 : Measurement of Civil Engineering Works II**

➤ **Measurement of Civil Engineering Works II : 4 credits (60 hours); L, T, P, SPW**

Theoretical Content

1. Measure works under Earth works - cutting and embankments
2. Measure works under in situ, and pre-cast concrete, including ancillaries in culverts, bridges, retaining walls, dams, etc]
3. Measure works under roads and air-fields
4. Measure works under piling and ancillary works
5. Measure works in railway tracks
6. Measure works in pipelines (for gas and water), sewers and drains
7. Measure works in structural steel works and metal works
8. Measure works in Timber
9. Measure works in painting and water – proofing fencing, tunnelling, etc.
10. Explain preamble and preliminary clauses in Civil Engineering works
11. Identify the importance of preamble and preliminary clauses
12. Write typical preamble clauses for different work sections in CESMM
13. Write typical preliminary descriptions for bill of quantities items in accordance with CESMM

Practical Content

1. Know how to prepare and write preamble and preliminary clauses for bills of Quantities in accordance with the CESMM
2. Write typical preamble clauses for different work sections in CESMM
3. Write typical preliminary descriptions for bill of quantity items in accordance with CESMM

❖ **REM 236 : Building Services and Maintenance Course**

➤ **Building Services and Maintenance Course : 4 credits (60 hours); L, T, P, SPW**

1. **Understand the principles and techniques of water supply to buildings**
 - Describe the main sources of water supply

- Sketch and explain methods of treatment and storage of water
 - Sketch and explain distribution methods
 - Sketch and explain supply to multi-storey buildings and associated problems.
 - Sketch and describe types of sanitary fittings in buildings
2. **Plumbing and Waste Systems**
 - Explain the design requirements for efficient system
 - Describe the cause of loss of trap seals together with precaution to avoid it
 - Describe pipes and pipe fittings in use
 - Assess the relative merit and demerits of different soil and waste systems
 - Explain methods of testing drainage
 3. **Know the various methods of disposing wastes from buildings.**
 - State the methods of waste disposal: biological processes, landfill processes, incineration etc
 - Describe the methods in 3.1
 - Outline the basic methods of sewage and waste disposal
 - Describe the design considerations of sewage treatment plant
 - Describe a treatment plant and the treatment process
 - State the regulation code of practice that governs its functionality
 - State methods of providing fresh air to sewage lines
 4. **Understand the supply and methods of distribution of gas into buildings.**
 - State the sources of gas
 - Describe the statutory law and building regulations that govern it
 - Compare its merits and demerits over electricity
 5. **Various equipment used for moving people in high raised buildings.**
 - List different types of mechanical movements required in high raised buildings
 - Explain the factors governing selection for different situations
 6. **Understand refuse disposal system and their incorporation in buildings.**
 - Explain domestic, commercial and industrial refuses and possible hazard arising from them
 - Describe common domestic refuse installation in building. Refuse dirt, grinder machinery
 - Describe the site suitable for disposal of controlled refuse and uncontrolled tipping sites

❖ REM 237 : Methodology of drafting the internship report / LAW

➤ Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW

A. Drafting and structuring of probation report

1. General Approach

- Nature and contents of internship report;

- Paragraph;
- The style and spelling.

2. **Structuring of the document**

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. **General information**

- Remission of the probationary report;
- Choice of software.

2. **Rules of presentation**

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. **Notes at the bottom of the page**

4. **Floaters**

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. **Bibliography**

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ REM 241 : Statistics

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

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ REM 242 : Computer Science II / BQHHSE

➤ Computer Science II : 5 credits (75 hours); L, T, P, SPW

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - Structuring of a program;
 - The descriptions of data, actions.

❖ REM 243 : Advanced Measurement of Construction Works IV

➤ Advanced Measurement of Construction Works IV : 4 credits (60 hours); L, T, P, SPW

Theoretical Content

1. Explain preamble and preliminary clauses
2. Identify the importance of preamble and preliminary clauses and their differences
3. Write typical preamble clauses for different work/trade sections

4. Write typical preliminary clauses for Bills of Quantities items in accordance with SMM
5. Measure works in demolitions and alterations
6. Measure shoring and scaffolding in structures
7. Describe the various processes in Bills preparation from taking - off stage to Billing stage
8. Explain the traditional and modern methods of Bill Production e.g. cut and shuffle
9. Explain the direct billing method of Bills of Quantities
10. Use standard phraseology of description for Bills of Quantities
11. Identify the different formats for arranging Bills of Quantities items, and when to use each format
12. Prepare a complete Bill of Quantities for a selected single storey building which should incorporate taking-off squaring, abstracting, billing and including writing all necessary preliminary and preamble clauses
13. Use computer to prepare a complete bill of quantities following procedure

Practical Content

1. Measure works in demolitions and alterations
2. Measure shoring and scaffolding in structures
3. Prepare a complete Bill of Quantities for a selected single storey building which should incorporate taking-off squaring, abstracting, billing and including writing all necessary preliminary and preamble clauses
4. Use computer to prepare a complete bill of quantities following the procedure

❖ REM 244 : Measurement of Heavy Engineering Works

➤ **Measurement of Heavy Engineering Works : 3 credits (45 hours); L, T, P, SPW**

Theoretical Content

1. **Understand the scope of Heavy Engineering works**
 - Define heavy engineering works
 - Know the constituents of heavy engineering works
 - Explain the components of:
 - Oil exploration
 - Petroleum refineries
 - Power generation
 - Telecommunication installation
 - Steel and metal production etc.
2. **Know the nature of I.C.E. standard method of measurement**
 - Discuss the various section of I.C.E. standard method of measurement
 - Construction of Site services
 - Scaffolding

- Steel works
- Plant
- Ductwork
- Pipe work
- Electrical work
- Instrumentation
- Insulation
- Protective covering
- Sundry items

3. Understand the use of discount cash flow techniques for capital budgeting and the preparation of master budgets.

- Explain the concept of :
 - DCF techniques
 - Time - value of money
- Carry out calculations on discount cash flow techniques and give advice based on the results of the calculations.
- Draw graphs of :
 - Cost against Time
 - Cash out against Time
 - Money received against Time
 - Contract value against Time
- Use the graph to determine :
 - Maximum amount required to finance a project
 - When the contract becomes self financing
- Explain the tenure average payment delay
- Explain what may be done to make a contract self financing

4. Understand the use of cost-in-use techniques for project evaluation purposes

- Explain the following terms :
 - Initial cost
 - Running cost
 - Maintenance cost
 - Cost - in - use
 - Life cycle costing
- Carryout simple cost -in - use calculation to aid decision on :
 - Choice of alternative compound
 - Choice o type and layout of life installation
 - Choice of alternative decisions
- List sources of information for cost-in-use exercises
- Explain the merits and demerits of cost-in-use techniques
- Draw sensitivity analysis graphs to show the effect in cost of :
 - Charge in interest

- Charge in functional life of buildings
- Use the graphs to make projections

❖ REM 245 : Construction Technology IV and Tendering and Estimating II

➤ Construction Technology IV : 3 credits (45 hours); L, T, P, SPW

Theoretical Content

1. **Understand the use of mechanical plants and Equipment.**
 - Select various plants and equipment for building works
 - Use the plants in above
 - Identify different types of excavating plants, concreting plants, cranes, dumpers, and earth moving equipment
 - Describe various types of power hand tools
2. **Know fire precautions and preventions**
 - Define fire
 - Describe fire precautionary measures
 - Explain the fire resistance of elements
3. **Understand railway construction.**
 - Recognize all types of railway tracks
 - Describe ballast, ties, tie plates, tail joints, anchors, welded rails, switches, and crossings
 - Outline various defects and failures on railway tracks and how to correct them
 - Explain how to maintain railway tracks
4. **Understand airport Construction**
 - List the functional requirements of airport
 - Describe classes and standards for airports
 - Explain airport drainage and grading
 - Define airport lighting, beacons, wind indicators, runway lights, light controls, heliport, air traffic control, threshold lightings, sequenced lights, etc.
5. **Know simple tunnels**
 - Describe simple tunnels
 - Describe methods of support in tunneling
 - Solve excavation and underground water problems
 - Describe methods of excavating tunnels
 - Describe ways of removing muck from tunnels
 - Explain the various principles of shaft and chivvy construction
6. **Know the construction of reinforced concrete and pre-stressed concrete**
 - Describe types of reinforcement and their respective qualities
 - Differentiate ordinary reinforcement concrete, pre-stressed concrete and pre-cast concrete

- Describe methods of fixing; cover spacing, lapping, bending, etc.
- Describe systems of pre-tensioning and post-tensioning

➤ **Tendering and Estimating II : 2 credits (30 hours); L, T, P, SPW**

1. Explain modern bidding strategies.
2. Explain the bidding procedures and the role of different parties involved in preparation and submission of bids.
3. Compute the unit rates for final sub-circuits in concealed conduct systems, and surface wiring systems.
4. Build-up unit rates for plumbing works and associated pipe work.
5. Know how to analyse tenders
6. Know how to write tender reports for selected projects such as duplex, high rising building, etc

❖ **REM 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 Internship journal
4. Choice of the theme of work in collaboration with the professional trainer and the academic supervisor
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

❖ **REM 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.

4. **The regulations on term: the effects of trade**

- Definition;
- Principles;
- Calculations.

5. **The depreciation and amortization**

- Definition;
- Accounting registration;
- Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**

- Summary presentation of the balance sheet.

2. **Study of the structure of the balance sheet**

- Calculations of ratios.

3. **Functional analysis of the balance sheet**

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

4. **Differential analysis of the balance sheet**

- Definition;
- Principles;
- Computations;
- Table of differential exploitation.

C. Analytical management accounting

1. **Generality on the cage**

- Objective;
- Role;
- Concept of burden.

2. **Analysis of expenses**

- Liable burden
- Direct and indirect expenses;
- Valorization of stocks.

3. **Method of full costs**

- Cost of purchase;
- Cost of production;
- Cost of returns;
- Calculation of the result.

➤ **Economics: 2 credits (30 hours); L, T, SPW**

1. **Notions of general economics**

- Introduction;
- Consumption and production;
- The raising of income;
- The currency and credit;
- The prices;
- The concept of growth and development.

2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

The Minister of Higher Education

Pr Jacques FAME NDONGO

Field : CIVIL ENGINEERING

Specialty :

ROADS AND CIVIL ENGINEERING

1. The objective of the training

This specialty leads to the training of professionals who master all stages of the project: the technical study of the work from the specifications, evaluation of the budget as well as the preparation, coordination and follow-up of the project, execution of the site until its reception. The latter intervene in all types of public and private works such as road works, pipeline works, general earthworks, the realization of infrastructure and major equipment.

2. Expected skills

→ Generic skills

- Work independently and collaborate in a team;
- Analyze and synthesize a professional document (French, English);
- Communicate orally and in writing, in or out of the company (French, English);
- Participate in / lead a project management process;
- Know and exploit the professional and institutional networks of the public works sectors.

→ Specific skills

- Make use of the technical documents provided by the engineer;
- Control different types of works and equipment as well as the organization of work;
- Control the regulation, layout and execution of road works;
- Control technical rules and working methods which determine the execution of the works;
- Know road materials in terms of their development and use in public works.
- Participate in the preparation of the project by realizing the projected budget
- Choose human and material resources;
- Improve the technical and economic conditions of the site;

- Establish the health and safety plan;
- Direct the works of the site until their reception according to the specifications;
- Control and animate teams;
- Ensure relations with the contractor and outside organizations.

3. Career opportunities

- Site manager;
- Work leader;
- Drafting designer of public works structures;
- Price manager;
- In charge of general affairs

4. Organization of the Teachings

• FIRST SEMESTER

Field: Civil Engineering		Specialty: Roads and Civil Engineering Structures					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RCE111	Mathematics I	30	20	0	10	60	4
RCE112	Physics and chemistry I	30	20	15	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
RCE113	Soil Mechanics I and Geology	35	20	10	10	75	5
RCE114	Building and Road Technology	35	10	20	10	75	5
RCE115	Materials and Water	30	10	15	5	60	4
RCE116	Computer Assisted drawing	20	10	20	10	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RCE117	Bilingual training	20	10	10	5	45	3
Total		200	100	90	60	450	30

• SECOND SEMESTER

Field: Civil Engineering			Specialty: Roads and Civil Engineering Structures				
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RCE121	Mathematics II	30	15	10	5	60	4
RCE122	Computer Science I / Fluid Mechanics	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
RCE123	Soil Mechanics/ Strenght of materials	30	15	20	10	75	5
RCE124	Practicals / Technical Drawing	35	10	20	10	75	5
RCE125	Quantities and Transportation Engineering I	30	15	10	5	60	4
RCE126	Structural Analysis	15	10	30	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RCE127	Creation of Company / Civic and Moral Education	10	10	20	5	45	3
Total		190	95	120	45	450	30

• **THIRD SEMESTER**

Field: Civil Engineering		Specialty: Roads and Civil Engineering Structures					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RCE231	Mathematics III	30	15	10	5	60	4
RCE232	Computer Sciencell / Geotechnics	30	15	20	10	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
RCE233	Design And Transportation II	30	15	20	10	75	5
RCE234	Technical drawing	20	10	25	5	60	4
RCE235	Roads and Highway Engineering	30	15	20	10	75	5
RCE236	Civil Engineering quantity and specifications	20	10	20	10	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RCE237	Methodology of drafting internship report /LAW	20	10	10	5	45	3
Total		180	90	125	55	450	30

• **FOURTH SEMESTER**

Field: Civil Engineering			Specialty: Roads and Civil Engineering Structures				
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
RCE241	Statistics	30	20	0	10	60	4
RCE242	Geology and Hydrology	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
RCE243	Reinforced Concrete Design Prestressed Concrete Design	25	10	20	5	60	4
RCE244	Building Technology, Highways And Bridges	25	10	20	5	60	4
RCE245	Engineering Survey/ Environmental Engineering	30	10	15	5	60	4
RCE246	Professional Internship			60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
RCE247	Accounting andEconomics	20	10	10	5	45	3
Total		180	80	135	65	450	30

5. Course Content

❖ RCE 111 : Mathematics I

➤ Mathematics I: 4credits (60 hours); L, T, SPW

1. Functions of a real variable
2. Circular and hyperbolic 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

❖ RCE 112 : Physics and Chemistry

➤ Physics I : 3 credits (45 hours); L, T, P, SPW

Mechanics

1. **Kinematics**

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. **Action of forces on a material point**

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. **Gravitation**

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. **Work, power, energy and momentum**

- Work;
- Power;
- Energie;
- Momentum

5. **Action of the forces on a solid body**

- Statics;
- Kinetics of solid bodies.

6. **Fluid Mechanics**

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. **Nuclear Reactions**

- Describe the structure of a nucleus (Mass number, atomic number).
- Characterization of isotopes;
- Distinguish the different reactivity (spontaneous and non-spontaneous reaction);
- Establish the equation of a radioactive transformation;
- Assess the fault of mass and the energy released by a nuclear reaction;
- Half-life of the radioactive decay;
- Activity of radioactive isotopes;
- Radiation protection;
- Experimental strategy to quantify the radiation received in function of time, distance and materials crossed.

2. **Pure body and mixtures**

- Distinguish between the different types of mixtures (suspensions, emulsions, alloys, aqueous solutions, smoke and fog);
- Solubility of a solute in a solvent. Homogenous and heterogeneous Solutions;
- Density of a solution, Molar concentration, Mass concentration, the molarity, molar fractions and mass concentrations.
- Distinguish between the molar concentration of the normality;
- Establish and apply the relations between sizes and molar mass quantities;
- Describe and explain the operation of a process of liquid-liquid extraction;
- Establish a balance sheet of overall material and partial to each of the constituents of a liquid-liquid extraction;
- Articulate and apply the law of perfect gases;
- Define the total pressure and partial pressures for a gaseous mixture;
- Difference between absolute and relative pressure;
- Establish the expression and evaluate the density of a real and a perfect gas;
- Describe and explain the process of extraction liquid-gas: absorption and desorption;

- Establish a balance sheet of overall material and partial to each of the components of an extraction liquid-gas.
3. **Chemical reactions**
 - Electronic structure of an atom;
 - Bonding (ionic and covalent bonds);
 - Molecular model of Lewis;
 - Establish an equation of reaction;
 - Establish a molar balance sheet;
 - Standard enthalpy of reaction;
 - Exothermic and endothermic reactions;
 - Chemical equilibrium of reaction: Equilibrium constant;
 4. **Speed of chemical reaction**
 - Set the speed of a reaction by report to a reagent or product ;
 - Define the constant speed;
 - Set the order of a reaction by report to a reagent and exploit the equation giving its concentration as a function of time;
 - Define the Time of half-reaction;
 - Identify the factors kinetics: influence of temperature and concentration from follow-up data on the reaction;
 - Explain the role of a catalyst;
 - Operate the curve giving the evolution of a composition of a reagent or a product in the time to identify the order of reaction and evaluate the speed constant and the time to half-reaction.
 5. **Reaction in aqueous solution; Acidic, basic and oxido-reduction**
 - Define the specific vocabulary: acid, base according Brönsted, oxidizing, reducer;
 - Oxidation, reduction, torque acido-basic, redox couple;
 - Acido-basic reaction; redox highlighting; exchanges of protons and then of electrons;
 - Establish a link between the powers dissociating, dispersant and solvating of water and its physical properties and molecular structure;
 - Explain the particular case of the water: couples in the water, autoprotolyse, K_e , ampholyte;
 - The reactions acido-basic;
 - Redox reactions.
 6. **Organic chemistry**
 - Identify the gross formulas, developed planes, semi-developed topological and isomers of Simple hydrocarbons (alkanes, Cyclanes, alkenes, benzene) and their derivatives (alcohol, carboxylic acid, aldehydes and ketones) and know the appoint;
 - Establish a link between the structure of a molecule of hydrocarbon and its chemical properties;

- Distinguish between the three types of reactions in organic chemistry: substitution reactions, addition and elimination;
- Distinguish monomer and polymer;
- To distinguish the types of reactions of polymerization;
- Describe the properties of a few industrial polymers.

❖ **RCE 113 : Soil Mechanics and Geology**

➤ **Soil Mechanics I : 3 credits (45 hours); L, T, P, SPW**

1. Expensive soils, distribution and identification of expensive soil, design of expansive soils;
2. Earthquake engineering- the geophysics of earthquakes, intensity, magnitude, geotechnical site response to earthquakes;
3. Earth and rock filled dams: dam failures, factors influencing choice of cross-section, site investigation and material survey, design criteria, foundation treatment;
4. Environmental geotechnics: geotechnical consideration for siting of landfills;
5. Geological aspect of groundwater recovery: Hydrologic cycle, groundwater flow, and inter-relationship between groundwater and surface water,
6. Measurement of groundwater levels and permeability during site investigation,
7. Ground water reservoir, artificial and induced landfill and ground water pollution, Groundwater abstraction , subsidence and sea water intrusion,
8. Geotechnical problems associated with ground water;
9. Environmental impact assessment.

➤ **Geology : 2 credits (30 hours); L, T, P, SPW**

1. The earth: surface structure and chemical composition;
2. Mineralogy: properties of common rock forming mineral, clays, minerals and silicates;
3. Major rock types: igneous, sedimentary, metamorphic rocks, formation and properties;
4. Geological structures: dip and strike, folds, faults and joints;
5. Geological maps: interpretation and geological maps, geological sections, geological time scales;
6. Rock and civil Engineering: classification of rocks, engineering properties of rock, evaluation of rocks as aggregates

❖ **RCE 114 : Building and road technology**

➤ **Building technology : 3 credits (45 hours); L, T, P, SPW**

1. General notion of building conception
2. Site/oil investigation

3. Earthworks and setting out
4. Concrete and pre-stressed concrete technology
5. Continuous beams and pillars
6. Ground floors and decking
7. Foundations
8. Special construction
9. Thermal and sound insulation
10. Walls and openings
11. Underpinning
12. Electrical installation
13. Diaphragms and sheet piling
14. Generalities on waste water purification
15. Organization and functioning of a purification station
16. In-situ purification structures

➤ **Roads construction : 2 credits (30 hours); L, T, P, SPW**

1. Generalities on roads construction and equipment
2. Roads layout (geometrical characteristics, research of layout, setting out of curves)
3. Roads techniques (earthworks, pavement, design of the structure of road)
4. Roads drainage and maintenance

❖ **RCE 115 : Materials and water**

➤ **Materials and water : 4 credits (60 hours); L, T, P, SPW**

1. **Water supply and sewerage systems**
 - Water supply system component
 - Sewerage system components
 - Pollutants
 - Water treatment process
 - Sewerage treatment process
 - Project for the application of the knowledge
 - Biological unit process: aerobic process, anaerobic process, activated sludge treatment plant, trickling filter;
 - Chemical unit process:
 - Water softening, disinfection gas transfer and coagulation;
 - Physical unit operations:
 - Screening, mixing, flocculation, sedimentation, filtration;
 - Industrial waste management
 - Air pollution;
 - Kinetics of reactors.

❖ RCE 116 : Computer Assisted drawing (CAD)

➤ Computer Assisted Drawing (CAD): 4 credits (60 hours); L, P, SPW

1. Know the different models used in CAD/CAM
2. Choice and characteristics of the hardware
3. The databases in CAD/CAM
4. The interfaces and exchanges
5. Plandrawing
6. 3D drawing
7. Graphics reproduction
8. Interior installations

❖ RCE 117 : Bilingual training

➤ English: 1.5 credits (22 hours 30mn)

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
 - How to introduce oneself
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;
 - Lettre / memo writing and minutes of a meeting

➤ French : 1.5 credits (22 hours 30mn)

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

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des texts de nature diverses (littéraire, non littéraire,image fixe ou mobile, dessin de presse,carricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **CET 121 : Mathematics II**

➤ **Mathematics II: 4 credits (60 hours); L, T, SPW**

1. Numerical sequences
2. Numerical series
3. The Fourier series
4. Laplace transformation
5. Fourier transform
6. Functions with several variables - scalar and vectors fields and a few applications

➤ **Computer Science I : 3 credits (45hours); L, T, P , SPW**

1. **General information and vocabulary**
 - Concept of information and computer science;
 - Resolution of problems by computer;
 - Typology and computer configuration;
 - Fields of application of computer;
2. **Representation and processing of information**
 - Systems of numbers;
 - Representation of numbers and characters (coding of information);
 - Boolean logic;
 - Calculation circuits and memory;
 - Presentation and differences between digital and non-digital data.
3. **Structure and operation of a micro-computer**
 - Architectures of micro-computers ;
 - Functional units (Central Processing Unit, input and output units);
 - Architecture and performance of microprocessors;
 - Programming a micro-computer (binary and hexadecimal programming, assembling and evolved languages);
 - Presentation and roles of programs; their applications.
4. **Border" machine (Hardware) - Man (Software)" as solutions to problems**
 - The BIOS;
 - The applications systems;
 - The application programs
5. **Operating the machine and examples of operating system**
 - WINDOWS (DOS);
 - Linux: an interesting alternative.
6. **A few examples of application software**
 - The "Package Microsoft Office" (Word, PowerPoint, Excel);
 - The navigation software and search engines on the Web.

➤ **Fluids Mechanics : 2 credits (30 hours) ; L, T, P , SPW**

1. **Fundamental concepts in fluid mechanics;**
2. **Characteristics and properties of fluid;**
3. **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);
- 4. **Kinematics of fluid motion:**
 - Velocity,
 - Acceleration,
 - Streamlines,
 - Stream-tubes,
 - Particle paths,
 - Streak lines;
- 5. **Definition of irrotational and rotational flow;**
- 6. **Circulation;**
- 7. **Stream function and velocity**
- 8. **Potential functions for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.**

❖ RCE 123 : Soil mechanics II/ Strength of material

➤ Soil mechanics II : 3 credits (45 hours) ; L, T, P , SPW

1. **Generalities :**
 - Identification and classification of soils and soil parameters,
2. **Site investigation :**
 - Introduction,
 - Preliminary exploration;
3. **Fields reconnaissance, local experience, detailed subsurface exploration;**
4. **Methods permitting visual examination :**
 - In-situ examination,
 - Sampling,
 - Types of boring,
 - Borehole testing,
 - Geophysics of piles,
 - Load carrying capacity of piles,
 - Pile driving,
 - Settlement of single piles,
 - Settlement of groups,
 - Drilled caissons ;
5. **Stability of excavation-earth pressure on braced excavation, stability of excavation in soils ;**
6. **Tropical soils :**
 - Introduction to unsaturated soils,
 - Engineering implications of tropical weathering ;
7. **Rock slope stability analysis :**
 - Rock strength and yield,

- Time dependency,
- Discontinuities in rocks,
- Behavior of rock masses.

8. **Environmental impact assessment**

➤ **Strength of materials II : 3 credits (45 hours) ; L, T, P , SPW**

1. Normal and shear stresses, combined bending and direct stress
2. Moving loads
3. Beams with internal hinges
4. Cables and arches
5. Influence line
6. Columns, Euler's theory of buckling
7. Stresses and strains in one-dimensional structural elements : lateral strain and Poisson's ratio, strain energy from normal and shear stress ;
8. Temperature stresses ; plastic stress : strain behavior of material, properties of areas, moments of area ;
9. Element subjected to general stresses and strains in two dimensional structural systems
10. principal stresses and strains, strain energy from normal and shear stresses, Mohr's stress circle, Mohr's strain circle ;
11. Relationships between the elastic constants bending in beams : shears stress in open and closed section and shear centre ;
12. Composite beams: bending and shear stresses in beams of dissimilar materials.

❖ **RCE 124 : Pratics**

➤ **Pratics : 5 credits (75 hours) ; L, T, P , SPW**

1. **Geo materials**
 - Tests on soil identification
 - Test on soil characterization
 - Tests on resistance of soil
 - Test related to the improvement of the shearing capacity of soil
2. **workshop practice**
 - Workshop safety rules and regulations
 - Building practice (bonding, masonry, other models)
 - Reinforced concrete elements (formwork and reinforcement)
 - Electrical installation
 - Wood work joints and connections

➤ **Quantities and transportation/ engineering I : 4 credits (60 hours) ; L, T, P , SPW**

1. **Civil engineering quantities**

- Elements of contract law, conditions of contract- general and special,
- Types of civil engineering contract,
- Bills of quantities preparation,
- Measurement of civil engineering works,
- Work classification

2. **Road systems and structures**

- Road categories
- Pavement types and materials used in the highway network
- Roles of highway engineer and technicians
- Urban and rural road categories
- Design of flexible, rigid, flexible composite and rigid composite pavements
- Function of layers in pavements and materials used

3. **Alternative transportation systems**

- Airport classification
- The different components of an airfield
- Recommendations for airport and selection of site for airport
- Determination of runway orientation and number
- Design of airport pavements
- Basic consideration for harbor design
- Existence and significance of waves in light water and shipprope protection
- General concept of railway transportation system
- Design in geometrically gar rail track
- Track maintenance
- Principles of signaling a station
- Characteristics of rapid rail system

4. **Traffic engineering**

- Flow of traffic as both a discrete or continuous process
- Characteristics of a traffic flow that can be identified
- Inter-relationship between the various flow parameters
- Terminals for transportation and the design of parking facilities
- Working of traffic signals
- Capacity of transportation facilityat different levels of services and the factors that affect capacity and service volumes
- Improvement of operation of a transportation scheme

5. **Transport planning**

❖ RCE 126 : Structural Analysis

➤ **Structural Analysis : 4 credits (60 hours) ; L, T, P , SPW**

❖ RCE : Creation of Company and civic and moral education

➤ **Creation of company:1 credit (15 hours); L, T, SPW**

1. Concept of the entrepreneur
2. Motivations for company creation
3. Search for ideas and evaluation
4. Sesearch for funding
5. Choice of a legal status
6. Ethical aspects of a company

➤ **Civic and Moral Education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property unto collective's goods;
- 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

❖ RCE 231 : Mathematics III

➤ **Mathematics III : 4 credits (60 hours); L, T, SPW**

1. Linear Systems
2. Complex numbers

3. Polynomials and rational fractions
4. Vector spaces and Euclidean space vector
5. Linear applications
6. Matrices

❖ **RCE 232 : Computer Science II/ Geotechnics**

➤ **Computer Science II : 2 credits (45 hours); L, T, P, SPW**

1. **Introduction**
2. **Fundamental elements**
 - Problem and algorithm;
 - Program and programming language;
 - From problem to solution by computer;
 - The paradigms of programming.
3. **Concepts of programming in C++**
 - Presentation and description of programming language;
 - The structuring of a program;
 - Descriptions of data, actions;
 - Style of programming.

➤ **Geotechnics : 3 credits (45 hours); L, T, P, SPW**

❖ **RCE 233 : Design and Transportation II**

➤ **Design and Transportation II : 5 credits (75 hours); L, T, P, SPW**

❖ **RCE 234 : Technical drawing**

➤ **Technical drawing : 5 credits (75 hours); L, T, P, SPW**

1. Generalities of drawing (terminology)
2. Geometrical drawings
3. Projections and perspectives
4. Dimensioning
5. Drawing of plans and consultative documents
6. Building permit
7. Building permit of a bungalow project
8. Building permit of a storey building project
9. Engineering drawing
10. Design structural drawings
11. Design basic structural elements in reinforced concrete buildings
12. Carry out general arrangement and detailing

13. Carry out basic highway drawings
14. Draw in AutoCAD

❖ **RCE 235 : Highway Engineering**

➤ **Highway Engineering : 5 credits (75 hours); L, T, P, SPW**

Student will be able to:

1. Know how to locate highway routes.
2. Know how to design visible elements of a highway.
3. Know various pavement design data and methods.
4. Know alternative construction techniques in tackling complex situations
5. Know various parts of different cross-sections of roads.
6. Know the different types of culverts.
7. Know the different types of construction equipment.

Practical Content

Acquire design knowledge and construction techniques in Highway Engineering

❖ **RCE 235 : Civil Engineering Quantities and Specifications**

➤ **Civil Engineering Quantities and Specifications : 4 credits (60 hours); L, T, P, SPW**

Student will be able to:

1. Know how to measure construction works using SMM for building and Civil Engineering works for more complex and simple industrial building of over two stories.
2. Understand the measurement of drainage and utilities installations
3. Understand the different methods of processing, dimensioning building and preparing schedule.
4. Understand the basic principles and scope of estimating
5. Appreciate contractor's activities during the tender process
6. General Objective 6.0: Understand the measurement codes and measuring works in selected areas
7. Understand the measurement of quantities in Civil Engineering Works in particular and BEME.
8. Understand the principles of specification writing

❖ **RCE 237 : Methodology of drafting internship report / LAW**

➤ **Methodology of drafting the internship report: 1.5 credits (22 hours 30); L, T, SPW**

A. Drafting and structuring of probation report

1. **General Approach**

- Nature and contents of internship report;
- Paragraph;
- The style and spelling.

2. **Structuring of the document**

- Cover;
- Acknowledgments;
- Heading of the probation report;
- Executive Summary;
- List of figures and tables;
- Glossary;
- Body of the report of internship;
- Bibliography;
- Annexes;
- Summaries and keywords.

B. Formatting of the probation report

1. **General information**

- Remission of the probationary report;
- Choice of software.

2. **Rules of presentation**

- Size of the probation report;
- Page layout;
- Families of fonts;
- Sizes and styles of fonts;
- Spacings and pagination.

3. **Notes at the bottom of the page**

4. **Floaters**

- Tables;
- Figures;
- List of figures and tables;
- Equations;
- Glossary.

5. **Bibliography**

- Purpose of the bibliographical quotations;
- Format of bibliographical quotations; pop-up
- List of bibliographical references;
- Bibliographical references for electronic documents.

➤ **Initiation to the law: 1.5 credits (22 hours 30 min); L, T, SPW**

Objective: At the end of this course, students should be able to identify and explain some fundamental principles of business law, Labour 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. Business Law
2. Labour Law
3. Intellectual property Law

❖ RCE 241 : Statistics

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

1. Descriptive statistics of a dimension
2. Linear regression
3. Calculation of probabilities
4. The laws of probability
5. Sampling
6. Estimate
7. Hypothesis Test of KHI-two

❖ RCE 242 : Geology and Hydrology

➤ Geology : 3 credits (45 hours); L, T, SPW

1. Geophysics, geochemistry, geomathematics, geoinformatics and geostatistics;
2. Mineralogy, petrology, palaeontology, sedimentology, stratigraphy, structural geology and tectonics,;
3. Geomorphology, quaternary studies, soil science,
4. Palaeobiology, palaeoclimatology, palaeoecology and palaeo-oceanography;
5. Basic of hydrology and hydrogeology, environmental geoscience, meteorology, climatology, glaciology and oceanography;
6. Geological, geomorphological and soil mapping, remote sensing applications;
7. Volcanology, ore geology, geomaterials, basic of geotechnics, and economic geology.

➤ Hydrogeology : 2 credits (30 hours); L, T, SPW

1. Design of subsurface investigations;
2. Three-point problem solution;
3. Flow net construction and analysis;
4. Use of Darcy's law and calculation of groundwater velocity;
5. Hydraulic conductivity and intrinsic permeability, calculation and measurement methods:

6. Aquifer types and groundwater occurrence;
7. storability and transmissibility, calculation and measurement methods;
8. Vertical groundwater gradients and flow;
9. hydrologic cycle;
10. Basic statistics and probabilistic methods;
11. Geographic information systems;
12. Aquifer testing.

❖ **RCE 243 : Reinforced Concrete Design**

➤ **Reinforced concrete design I : 4 credits (60 hours); L, T, SPW**

1. General information
2. Principles and hypotheses of justification of the sections
3. Calculation model of the limit state
4. Verification of the sections in the E.L.U. and E.L.S. according to BAEL90 and Eurocode 90
5. Condition of non fragility, deformation

❖ **RCE 244 : Building Technology, Highways and Bridges**

➤ **Building Technology, Highways and Bridges : 3 credits (45 hours); L, T, SPW**

1. General information
2. The conventions and standards of representations in Civil Engineering design
3. Architecture drawing
4. Different types of tasks
5. The Project

❖ **RCE 244 : Engineering Survey / Environmental Engineering and pollution**

➤ **Engineering Survey : 3 credits (45 hours); L, T, SPW**

Theoretical Content

1. **The principles of setting out compound and reverse curves**
 - Describe the characteristics of compound curves consisting of two or more circular curves.
 - Explain the use of formulae to compute setting out data.
 - Compute data needed to set out reverse curves.
 - Set out reverse curve using 1.3 above.
2. **The principles and methods of setting out transition curves**
 - Explain how transition curves are set out.
 - Describe the geometrical characteristics of transition curves.
 - Explain the use of formulae to compute setting out data.

- Set out composite curves i.e curves consisting of circular and transitional curves.
 - Calculate change from the initial point to the end of a route consisting of various types of curves.
3. **The principles of design and setting out of vertical curves**
- Explain the purposes of vertical curves.
 - List the types of curves used.
 - Identify the principal factors governing the length of vertical curves.
 - State the properties of the parabola as the curve normally adopted for vertical curves.
 - Derive formulae for computing data for a vertical curve.
 - Describe methods of setting out vertical curves.
 - Describe a vertical curve and set out data giving length of the curve, gradients of the intersecting slopes and the reduced level of at least one known point.
4. **The principles and methods of construction site surveys**
- Establish rectangular grid control for construction site surveys.
 - Describe other forms of control suitable for construction site surveys.
 - Explain suitable self-checking setting out methods for large construction sites with many large structures.
 - Set out specified levels from control levels.
 - Establish a permanent survey control system on completion of the major construction.
 - Explain how to overcome specific setting out problems due to impediments, destruction of control beacons, water obstacles, etc.
5. **The application of modern instrumentation and techniques in engineering surveys.**
- Use modern survey instruments in setting out and surveying routes and structures
 - Carry out the application of photogrammetry in route selection, earthwork calculations, measurement of deformations of structures, as well as built surveys, etc.
 - Explain the uses and advantages of digital ground models in route surveys.
 - Carry out some applications of micro-computers in engineering surveys
6. **The methods of surveying underground installations**
- Explain the need for surveying underground installations.
 - Describe the methods of locating underground installations,
 - Describe the method of surveying underground installations applying normal surface methods
7. **The principles of measurement of deformations and small movements with particular reference to monitoring the movements of dams.**
- Explain the differences between deformations and small movements of structure.

- Explain why measurement of deformations should be carried out e.g monitor the deformation of dams.
 - Describe methods to be adopted in establishing control for measurement of deformations.
 - Describe survey methods for monitoring horizontal deformations.
 - Use precise levelling in measuring vertical deformations
 - Describe the application of photogrammetry in the measurement of deformations
- 8. The principles and methods of engineering geodesy.**
- Explain the scope of engineering geodesy (Precise engineering surveys).
 - Identify the distinguishing features of engineering geodesy - geodetic accuracy, precise centering, use of precise instruments.
 - Specify the accuracy requirements of engineering geodesy and the instrumentation and observational procedures to achieve them.
 - Describe special computational methods used in precise engineering surveys.
 - Outline typical procedures for establishing microgeodetic control systems e.g for tunnel surveys, surveys of precise large structures (radio telescopes, particle accelerators, large ships, etc) and subsequent setting-out procedures.

Practical Content

Introduce the students to the Design of Horizontal and Vertical Surveys, Establish permanent controls, use of photogrammetry and computers in engineering surveys.

➤ Environmental Engineering and Pollution Control : 2 credits (30 hours); L, T,

SPW

- 1. Concept of environment and environmental health**
 - Explain the concept of Environment
 - Explain the concept of Health
 - Explain the concept of Environment health
- 2. Concepts of pollution and contamination**
 - Define pollution with examples
 - Define contamination with examples
- 3. Different types of environment**
 - Give examples of different types of environmental air, water, soil, social, work etc.
- 4. Different types of pollution and their effects**
 - Define air pollution, water pollution, land pollution, thermal pollution and noise pollution. Illustrate with appropriate examples
 - Identify the composition of the atmosphere
 - Explain:

- Particulate matters
 - Sulphur dioxide
 - Oxides of nitrogen
 - Carbon monoxide
 - Hydrocarbons
 - Fluorine compound
 - Explain particulate fall-out
 - Describe air pollution indoors.
 - Describe the units of measurement of air pollutants.
 - Test for air pollution
5. **Classification of water-related diseases**
- Explain water-borne, water-based, water-washed and water related diseases
 - Explain faecal-oral transmitted diseases.
 - Explain the effects of water quantity and water quality on water related diseases.
 - Differentiate between epidemics and endemic diseases.
 - Explain the motive of WHO drinking water and sanitation laws.
 - Describe the life cycle and methods of control of the following diseases
 - Schistosomiasis
 - Filariasis
 - Malaria
 - Common out nematodes
 - Diarrhoea diseases.
 - Propose measures to curb the diseases in your area of operation
6. **The basic principles of pollutants emission and disposal**
- Explain the physical characteristics of the atmosphere
 - Describe methods of pollution dispersion in the atmosphere.
 - Explain how to predict the ground level concentration of pollution
7. **The effects of specific environmental pollution and self-purification in water bodies**
- Describe the effects of air pollution
 - Propose measure to curb air pollution in the environment,
 - Describe the various methods of air pollution control
 - Define water pollution
 - State the source of different type of water pollution (surface and groundwater)
 - State the mechanism of self-purification of stream
 - Test for water pollution.
 - Produce results making future projections.
 - List the effects of pollutants on receiving stream.
 - List various control measures

- Apply these control measures in your state of operation.
 - Define noise pollution
 - List the sources of noise pollution.
 - Determine (Measure) noise pollution in your area of operation.
 - Describe the effects of pollution on human health.
8. **Various methods of pollution control including vector control**
- Define the vector control chemicals.
 - Name the aquatic growth control
 - Explain the effects of ventilation, artificial lighting illumination on human health.
 - Describe the industrial hazards of working environment.
 - State the control of occupational health hazards.
 - Identify the sources of hazardous chemicals.
 - State the characteristics of hazardous chemicals from industries and agriculture.
 - Explain the effects of hazardous chemicals on water bodies.
 - Carry out test for hazardous chemicals.
 - Outline control measures.
 - Carry out practical exercise on each of the topic above
9. **The management of solid wastes and their effects on the environment**
- Explain the environmental effects of solid waste management.
 - Identify the different methods of solid waste, waste collection treatment and disposal e.g., sanitary landfill, incineration.
 - Explain the general principles of sanitary land fill.
 - Explain the general principles of:
 - High temperature incineration.
 - Pulverization and bailing.
 - Describe the general principles of material recovery and conversion from solid wastes
 - Appreciate the effects of solid wastes management on the environment.
 - Design refuse disposal unit at your state of operation.
 - Undertake the construction of refuse disposal unit using the principles on 9.4 above.
10. **The health effects of basic utilities and work environments.**
- The effects of ventilation, artificial lighting illumination on human health.
 - Describe the industrial hazards of working environment.
 - State the control of occupational health hazards.
11. **The basic principles of environmental impact assessment**
- Define EIA and state the basic principles
 - Outline the basic steps in EIA
 - Explain environmental impact statements.

- Explain environmental audits.
- Discuss specific development projects vis-à-vis.
- Prepare EIA, EIS for two different projects

Practical Content:

Conduct practicals to improve the understanding of theoretical content

❖ **RCE 246 : Professional internship**

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

1. Arrival and integration in the enterprise
2. Working in an enterprise
3. Holding of the Internship journal
4. Choice of the topic of work in collaboration with the professional trainer and the academic supervisor
5. Elaboration of the research outline
6. Resources to exploit
7. Organization of work
8. Drafting of the report
9. Presentation of the report before a jury

❖ **RCE 247 : Accounting and Economics**

➤ **Accounting: 1 credit (15 hours); L, T, SPW**

A. General Ledger

1. **The Company and its heritage**
 - Concept of the enterprise;
 - Balance sheet and its variations.
2. **Analysis of the current operations of the company**
 - Concept of jobs resources;
 - The Accounting transfer;
 - From accounts to balance.
3. **The operations of purchases and sales**
 - Billing ;
 - Accounting registration;
 - System of inventory;
 - Stock form.
4. **The regulations on term: the effects of trade**
 - Definition;
 - Principles;
 - Calculations.
5. **The depreciation and amortization**

- Definition;
- Accounting registration;
- Typology.

B. General introduction to the Financial Analysis

1. **Analysis of the balance sheet**
 - Summary presentation of the balance sheet.
2. **Study of the structure of the balance sheet**
 - Calculations of ratios.
3. **Functional analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.
4. **Differential analysis of the balance sheet**
 - Definition;
 - Principles;
 - Computations;
 - Table of differential exploitation.

C. Analytical management accounting

1. **Generality on the cage**
 - Objective;
 - Role;
 - Concept of burden.
2. **Analysis of expenses**
 - Liable burden
 - Direct and indirect expenses;
 - Valorization of stocks.
3. **Method of full costs**
 - Cost of purchase;
 - Cost of production;
 - Cost of returns;
 - Calculation of the result.

➤ Economics: 2 credits (30 hours); L, T, SPW

1. **Notions of general economics**
 - Introduction;
 - Consumption and production;
 - The raising of income;
 - The currency and credit;
 - The prices;
 - The concept of growth and development.

2. **The Company**
 - Introduction;
 - Typology of enterprises;
 - Structure and organization of the enterprise;
 - The company and ethics;
 - How to undertake (create, decide, manage).
3. **The place of the company in the economic fabric**
 - Concept of the environment of the company;
 - The inter- and extra-enterprises relationships;
 - The commercial activity;
 - The notion of strategy.
4. **The productive activity**
 - The policies and processes of production;
 - The trade policies;
 - Logistics.
5. **The concept of management in the company**
 - The activity and financial resources;
 - The planning and management of human resources;
 - The planning and the management of material resources.
6. **Information and Communication in the Enterprise**
 - Role of information and communication;
 - Collection and organization of information;
 - Strategic diagnosis;
 - Decision System

The Minister of Higher Education



Pr Jacques FAME NDONGO

Field : MECHANICAL ENGINEERING

Specialty :

METAL CONSTRUCTION

Field:

MECHANICAL ENGINEERING

Specialty:

Metal Construction

1. The objective of the training

This specialty aims at training senior technicians for designing, performing, managing/ conducting and commercialisation of metal structures (bridges, towers, railways, airports, factories, locks, ports, silos, oils rigs, metal framework buildings).

2. Research Skills

→ Generic skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of metal construction sectors.

→ Specific skills

- Analyze the material means necessary to the achievement of the work;
- Streamline the Production and perform the quality control;
- Perform the calculation notes, design drawings in CAD/CAO and plans;
- Determine the estimated cost of a book and establish an estimate;

3. Career opportunities

- Work supervisor;
- Construction executive;
- Production manager in manufacturing facilities.

4. Organization of teachings

• FIRST SEMESTER

Field of study: Mechanical engineering		Specialty: Metal Construction					
Code	Course title	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental courses 30% (2 UC) 9 credits 135 hours							
MTC111	Engineering Mathematics I	40	30	0	5	75	5
MTC112	Engineer in the Society	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MTC113	General technology of metal works	30	25	15	5	75	5
MTC114	Static	25	17	0	3	45	3
MTC115	Drawing and descriptive geometry	25	20	25	5	75	5
MTC116	Welding I	15	15	40	5	75	5
Cross-sectional course 10% (1 UC) 3 credits 45 hours							
MTC117	Bilingual training	25	15	0	5	45	3
Total		200	137	80	33	450	30

• SECOND SEMESTER

Sector: Mechanical engineering		Specialty: Metal Construction					
Code	Course title	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental courses 30% (2 UC 9 credits 135 hours							
MTC121	Engineering Mathematics II and Fluid Mechanics	40	30	0	5	75	5
MTC122	Workshop Supervisor Management	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MTC123	Mechanical analysis	30	20	20	5	75	5
MTC124	Professional technology of Metal Works	45	25	0	5	75	5
MTC125	Processing Machining and forminting	10	10	35	5	60	4
MTC126	Practical work / Workshop	0	0	60	0	60	4
Cross- sectional courses 10% (1 UC) 3 credits 45 hours							
MTC127	Computer for Business I / Civic and Moral Education	30	15	0	0	45	3
Total		195	115	115	25	450	30

• **THIRD SEMESTER**

Sector: Mechanical engineering		Specialty: Metal Construction					
Code	Course title	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental courses 30% (2 UC 9 credits 135 hours)							
MTC231	Engineering Mathematics III, Legal and Economic Environment	40	30	0	5	75	5
MTC232	Computer for Business II and Computer programming	20	20	15	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MTC233	Welding and metal locksmithing	10	25	35	5	75	5
MTC234	Metal construction	25	20	25	5	75	5
MTC235	Aging, the degradation and protection of metal structures	25	15	15	5	60	4
MTC236	Professional technology of metal works II	25	15	15	5	60	4
Cross-sectional course 10% (1UC) 3 credits 45 hours							
MTC237	Environmental Engineering and Entrepreneuriatship	25	15	0	5	45	3
Total		170	140	105	35	450	30

• **FOURTH SEMESTER**

Sector: Mechanical engineering		Specialty: Metal Construction					
Code	Course title	Number of hours					Number of Credits
		L	T	P	SPW	Total	
Fundamental courses 30% (2 UC 9 credits 135 hours)							
MTC241	Engineering Mathematics IV	30	25	0	5	60	4
MTC242	Physics and chemistry	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
MTC243	Machining and Productique	25	20	25	5	75	5
MTC244	Exploitation of CAD/CAM software	20	10	25	5	60	4
MTC245	Project of Appeal of Offer	10	10	20	5	45	3
MTC246	Internship	0	0	60	30	90	6
Cross-sectional course 10% (1UC) 3 credits 45 hours							
MTC247	Industrial Safety Engineering Management Law and Economics	25	15	0	5	45	3
Total		150	100	140	60	450	30

5. Courses content

❖ **MTC 111: Engineering Mathematics I: 5 credits (75 hours); L, T, SPW**

Objectives: at the end of this course the student should understand basic equations-master, numerical methods solve statistical problems

1. Linear equation, differentiation, integration, geometric equations
2. Differentiation: Rolle's theorem and the mean-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, -partial differential equations, boundary value problems.

❖ **MTC 112: Engineer in the society: 4 credits (60 hours); L, T, P, SPW**

1. Introduction
2. Historical evolution of engineering
3. Career orientation on various engineering fields
4. Initiation and interpretation of administrative letters
5. Engineering and environmental pollution
6. Managing change
7. Organizational behavior, positive self-talk, managing stress
8. The industry and industrial psychology
9. Engineering contracts
10. Tendering for public contracts
11. Specifications writing
12. Law (tort, contract)
13. Organizational set up
14. Setting up an enterprise

❖ **MTC113: General Technology of Metal Works: 5 Credits (75 Hours); L, T, P, SPW**

1. Description of the structural steel
2. The steels of construction
3. The common structural steel shape
4. The Posts and beams
5. The gussets, angles, cover joints

❖ **MTC 114: Static: 3 credits (45 hours); L, T, P, PW**

1. Fundamental Principle of Static
2. static in two dimensions
3. Graphical static
4. structural analysis

❖ **MTC115: Drawing and descriptive geometry**

➤ **Technical drawing I: 3 credits (45 hours); L, T, P, SPW**

1. Engineering graphics as a language
2. A few definitions relating to the technical drawing
3. General rule of representation of a technical drawing
4. Representation of the views of an object (projection)
5. Representation of a tapped hole or not, blind or leading (through)
6. basic dimensioning of a detail drawing
7. pictorial drawings

➤ **Descriptive Geometry and Tracing: 2 credits (30 hours); L, T, P, SPW**

1. points in space
2. lines in space
3. Intersections of different shapes
4. Marking out of different shapes

❖ **MTC116: Welding I : 5 credits (75 hours); L, T, P, PW**

1. General information on the Weld
2. Oxyacetylene Welding
3. Electric Arc Welding

❖ **MTC117: Bilingual training: 3 credits (45 hours); L, T, SPW**

➤ **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 et usuel de la spécialité

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

❖ **MTC121: Engineering Mathematics II and Fluid Mechanics: 5credits (75hours); L, T, SPW**

➤ **Engineering Mathematics II:**

1. 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.

2. Statistics and Probability
3. 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

➤ **Fluids Mechanics**

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 functions for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ **MTC122: Workshop supervisor Management: 4 credits (60 hours); L, T, P, SPW**

Objectives: Understand workshop supervision, Understand loading and Schedules, describe workshop staff **organization**, differentiate the basic types of organization structure, Understand the responsible of technical adviser schedules, Understand the concept of planning and control, Understand the use of time sheet, Understand the capital expenditure budget proposal, Understand direct costs and indirect costs, Understand human relations & industrial psychology, Understand the concept of Motivation.

Contents: workshop supervision, loading and Schedules, basic types of organization structure, responsible of technical adviser schedules, concept of planning and control, use of time sheet, capital expenditure budget proposal, direct costs and indirect costs, human relations & industrial psychology, concept of Motivation.

❖ **MTC 123: Mechanical analysis**

➤ **Technical drawing II: 2 credits (30 hours); L, T, P, SPW**

1. Representation of sections (section lining, full section, half section,...)
2. The element of assembling drawing
3. Study of the links

➤ **Resistance of Materials : 3 credits (45 hours); L, T, P, SPW**

1. The hypothesis of the resistance of materials and simple solicitations
2. ISO system-hyperstatique

3. Simple solicitations, torsion, bending, state of stress and composed solicitations
4. Aspect mechanical sizing
5. The hypothesis of the resistance of materials
6. Stress and laws of behavior
7. Dimensioning structural drawing

❖ **MTC124: Professional technology of Metal Works: 5 credits (75 hours); L, T, P, SPW**

1. Beam on a pole by riveted and threaded
2. Beam on pole in welded frame
3. Support
4. The feet of poles the column bearing plates
5. Backbone of the attics

❖ **MTC125: Processing and formatting I: 4 credits (60 hours); L, T, P, SPW**

1. Sawing
2. Shearing
3. Punching
4. Grinding

❖ **MTC 126: Work Practices / Workshops: 4 credits (60 hours); P**

1. The work of the workshop
2. Work on the field

❖ **MTC127: Computer for Business I / Civic and Moral Education**

➤ **Computer for Business I: 2 credit (30 hours)**

1. Generalities, impact of computer on society, current notions, basic hardware, software and networking
2. Procedures in using computer systems
3. Practical approach - hands- on
4. MS word; -MS excel; -MS power point; -Ms access

➤ **Civic and moral education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property and collective's goods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;

- Ethical Problem ;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- 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

❖ **MTC231: Engineering Mathematics III, Legal and Economics Environment : 4 credits (60 hours); L, T, PW**

➤ **Engineering Mathematics III**

1. matrix theory, differential calculus
2. First order differential equations
3. Linear differential equations of higher order
4. Laplace transformation, integral calculus, vector calculus

➤ **Legal and Economics Environment**

1. Introduction to law -fundamental rights -Cameroon political history, re-unification, division of power, political and administrative institutions
2. The democratic process, political parties, civil society, pressure groups, local government, nation building, government budgeting
3. Managing debt crises, foreign aids, foreign policy, Cameroon and her neighbors, politics and trade.

❖ **MTC232: Computer for Business II and computer programming**

Objectives: at the end of this courses students should achieve knowledge and practical know-how related to computer concepts and programming

➤ **Computer for Business II: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

➤ **Computer programming: 2 credits (30hours); 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

❖ **MTC233: Welding and Metal locksmithing**

- **Welding II: 2 credits (30 hours); L, T**
 1. TIG welding
 2. Oxycutting
 3. Welding to the Argon
- **Metallic locksmith: 3 credits (45 hours); L, T, P, SPW**
 1. Terminology of the Locks
 2. Typology of the Locks
 3. Designation of the Locks
 4. Study of a few locks

❖ **MTC 234: Metal construction**

- **Study and Representation of Metal Constructions: 5 Credits (75 Hours); L, T, P, SPW**
 1. Standard representation of metal works
 2. Normalized representation of shapes
 3. Defense of bay, air vent and higher
 4. Balcony, custody, hood, grid
 5. Marquise, courette, door frame, frame and frame
 6. Chassis and stairs

❖ **MTC 235: Aging, the degradation and protection of metal structures**

- **Aging, the degradation and protection of metal structures: 4 credits (60 hours); L, T, P, SPW**
 1. The corrosion of metals
 2. Chemical degradation of minerals
 3. Friction and wear
 4. Protection of metal works
 5. Treatment of steels

❖ **MTC 236: Professional technology of metal works II**

- **Professional technology of metal works II: 4 credits (60 hours); L, T, P, SPW**
 1. Main types of struss
 2. The support of struss
 3. Bracing of the attics
 4. The portals
 5. The parts of the fence and the parts of the iron building
 6. Metal frame of the floors
 7. The metal covers
 8. The sheds

9. The metal stairs
10. The tubes in metal construction

❖ **MTC 237: Environmental Engineering and Entrepreneurship**

➤ **Environmental Engineering: 2 credits (30 hours)**

General objectives

Understand the various types of Environmental pollution and their effects on the environment, Understand various types of pollution, Know the generation of liquid wastes, Understand the methods of onsite handling storage and processing of liquid and solid waste, Know the method of solid and liquid waste collection, Understand the methods of transfer and transport of solid and liquid wastes, Understand the methods and equipment for solid and liquid waste processing, Understand the source and utilization of various forms of energy from the waste materials, Understand the source and utilization of various forms of energy from the waste materials, Understand the steps in implementing Environmental Standards.

Content

types of Environmental pollution and their effects on the environment, types of pollution, generation of liquid wastes, methods of onsite handling storage and processing of liquid and solid waste, method of solid and liquid waste collection, methods of transfer and transport of solid and liquid wastes, methods and equipment for solid and liquid waste processing, source and utilization of various forms of energy from the waste materials, source and utilization of various forms of energy from the waste materials, steps in implementing Environmental Standards.

➤ **Entrepreneurship: 1 credits (15hours);**

1. Generalities on enterprise
2. Wealth creation and how to make money
3. Evaluate the state of enterprise
4. Analyses of the activities of enterprise
5. Analyses of the cost effectiveness of an enterprise
6. Analyses of the structure of an enterprise
7. Analyses of the treasury of an enterprise
8. Budgeting
9. Elements of analytical accounting and management
10. Creating an Enterprise
11. Business plan

❖ **MTC 241: Engineering Mathematics IV**

➤ **Engineering Mathematics IV: 4 credits (60 hours); L, T, SPW**

1. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
2. special functions (basal function, splines and legendre)

3. statistical and numerical methods, statistics and probability
4. numerical analysis, series and sequences, linear programming

❖ **MTC 242: Physics and chemistry**

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

A- Mechanics

1. **Kinematics**
 - Introduction;
 - Repository system and position vector;
 - Speed and acceleration;
 - Movement in the field of gravity.
2. **Action of forces on a material point**
 - Principle of inertia and fundamental principle of dynamics;
 - The superposition of forces;
 - The forces of inertia;
 - Friction and frictional forces.
3. **Gravitation**
 - The force of gravity;
 - Law of gravitation;
 - Fields of forces.
4. **Work, power, energy and momentum**
 - Work;
 - Power;
 - Energie;
 - Momentum
5. **Action of the forces on a solid body**
 - Statics;
 - Kinetics of solid bodies.
6. **Fluid Mechanics**
 - Fluid and gas at rest;
 - The flow of incompressible liquid.

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

1. Structure of Matter
2. Chemical analysis
3. Chemical Notation Introduction
4. Chemical reaction and chemical equation
5. The refrigerants
6. The refrigerated oils
7. Chemistry and the environment: impacts of fluids and substances used in cold and air conditioning on the environment
8. Food Microbiology
9. Methods of conservation

10. Optimal condition for the refrigerated storage
11. Conservation of animal and plant products

❖ **MTC 243: Machining and Productique**

➤ **Machining and put in Form II: 3 credits (45 hours); L, T, P, SPW**

1. cutting up or sawing up
2. Bending
3. Folding
4. Drilling, thread and tapping

➤ **Productique: 2 credits (30 hours); L, T, P, SPW**

1. Organization of a workshop
2. Organization of the worksite
3. Production Scheduling
4. cost estimate of a work

❖ **MTC 244: Exploitation of CAD/CAM software**

➤ **Exploitation of CAD/CAM software: 4 credits (60 hours); L, T, P, SPW**

1. Software Environment
2. Taken in hand of the software
3. Implementation of some projects

❖ **MTC 245: Project of Appeal of Offer**

➤ **Elaboration of a folder of Appeal of offers: 3 credits (45 hours); L, T, P, SPW**

1. Description of a specifications
2. Mounting a file of appeal of offer
3. Team Work
4. Presentation on the themes defined

❖ **MTC 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

❖ MTC 247: Industrial Safety / Engineering Management law and Economics

➤ **Industrial safety 1 credit: (15 hours); L, T, P, SPW**

General objective:

Understand the importance of safety in industry, Know the causes and ways of preventing industrial accidents not caused by Fire, Appreciate what is involved in safety inspection, Appreciate the various causes and fire prevention in industry, Know the various methods and proceedings in firefighting, Appreciate the factories act and the principals involved in factory law.

Contents:

importance of safety in industry, causes and ways of preventing industrial accidents not caused by Fire, involvement of safety inspection, causes and fire prevention in industry, methods and proceedings in firefighting, factories act and the principals involved in factory law.

➤ **Engineering Management Law and Economics: 2 credit (30 hours); L, T, P, SPW**

Objectives: at the end of this course students should;

- understand basic principles, technics and practice of management, entrepreneurship law and economics

1. Engineering Management Law And Economics

- forecasting, planning, control, organization, coordination, motivation and communication
- Leadership, problem solving technics, human relation
- productivity, work flow, cost optimization, flow graphs
- work study, work measurement technics, incentives, wages, quality control, site meetings and organizational structure
- Use of planning tools (PERT, GANTT etc) with applications

2. Engineering Economics and Law

- Annual/present/net worth and rate of returns
- depreciation and amortization
- method of recording transactions, financial statement and balance sheet
- assets, liability, and long term capitals
- process of establishing forms
- labor unions
- termination of engineering contracts
- partnership
- business ownership
- arbitration
- breach of contract and liquidated damages

➤ **Labour Law: 1 credit (15 hours); L, T**

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 : MECHANICAL ENGINEERING

Specialty :

MECHANICAL MANUFACTURING

1. The objective of the training

This specialty aims and endowing skills has for the production of mechanical equipment, and for the engineering design of diverse mechanical components. It also allows for quality control.

2. Research Skills

→ Generic skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the mechanical construction and manufacturing sectors.

→ Specific skills

- Conduct a complex manufacturing study;
- Mastering of ICT tools related to mechanical manufacturing;
- Manage a mechanical manufacturing analysis project;
- Computer programming for digital controlled mechanical manufacturing machines;

3. Career opportunities

- Mechanical manufacturing Technician
- Designer;
- Metallurgical Technician;
- Steel metallurgist.

4. Organization of the Teachings

• FIRST SEMESTER

Field: Mechanical Engineering		Specialty: Mechanical Manufacturing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEM111	Engineering Mathematics I	40	30	0	5	75	5
MEM112	Enginer in the Society	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MEM113	Mechanical manufacture	40	20	12	3	75	5
MEM114	Materials and Applied Mechanics	50	20	0	5	75	5
MEM115	Maintenance an automation	40	10	20	5	75	5
MEM116	Engineering drawing and design	25	15	0	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEM117	Bilingual training	20	20	0	5	45	3
Total		255	130	32	33	450	30

• SECOND SEMESTER

Field: Mechanical Engineering		Specialty: Mechanical Manufacturing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEM121	Engineering Mathematics II and Fluid Mechanics	40	30	0	5	75	5
MEM122	Workshop Supervisor Management	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MEM123	Mechanical Analysis I	45	25	0	5	75	5
MEM124	Computer aided drawing (AutoCAD)	20	0	35	5	60	4
MEM125	Technology and practical of mechanical manufacturing I	10	0	45	5	60	4
MEM126	Computer Aided Manufacturing	15	5	50	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MME127	Computer for business I / Civic and Moral Education	30	15	0	0	45	3
Total		200	90	130	30	450	30

• **THIRD SEMESTER**

Field: Mechanical Engineering		Specialty: Mechanical Manufacturing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEM231	Engineering Mathematics III, Legal and Economic Environment	40	30	0	5	75	5
MEM 232	Computer for Business II and computer programming	20	25	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MEM233	Mechanical Analysis II	45	25	0	5	75	5
MEM234	Computer Aided Manufacturing - Computer Aided Drawing I	30	10	30	5	75	5
MEM235	Non- Conventional Manufacturing processes	25	17	0	3	45	3
MEM236	Technology and practical of mechanical manufacturing II	10	0	60	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEM237	Environmental Engineering and Enterpreneuriatship	25	15	0	5	45	3
Total		195	122	100	33	450	30

• **FOURTH SEMESTER**

Field: Mechanical Engineering		Specialty: Mechanical Manufacturing					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEM241	Engineering Mathematics IV	40	15	0	5	60	4
MEM242	Physics and chemistry	40	20	10	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
MEM243	Mechanics and Materials	40	30	0	5	75	5
MEM244	Computer-aided design II (CAD II)	10	0	30	5	45	3
MEM245	jigs and fixtures and automation	30	18	10	2	60	4
MEM246	Academic Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEM247	Industrial Safety Engineering Management Law and Economics	25	15	0	5	45	3
Total		185	98	110	57	450	30

5. Course content

❖ **MEM 111: Engineering Mathematics I : 5 credits (75 hours); L, T, SPW**

Objectives: at the end of this course the student should understand basic equations-master, numerical methods solve statistical problems

1. Linear equation, differentiation, integration, geometric equations
2. Differentiation: Rolle's theorem and the mean-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, -partial differential equations, boundary value problems.

❖ **MEM 112: Engineer in the society: 4 credits (60 hours); L, T, P, SPW**

1. Introduction
2. Historical evolution of engineering
3. Career orientation on various engineering fields
4. Initiation and interpretation of administrative letters
5. Engineering and environmental pollution
6. Managing change
7. Organizational behavior, positive self-talk, managing stress
8. The industry and industrial psychology
9. Engineering contracts
10. Tendering for public contracts
11. Specifications writing
12. Law (tort, contract)
13. Organizational set up
14. Setting up an enterprise

❖ **MEM 113: Mechanical Manufacture**

➤ **Manufacturing technology: 3 credits (45 hours); L, T, P, SPW**

1. Turning
2. Milling
3. Machining time
4. Techniques of assemblies
5. Broaching
6. Slotting
7. Metrology.

➤ **Analysis of manufacture I: 2 credits (30 hours); L, T, SPW**

1. Organization chart a manufacturing workshop
2. positioning and maintaining
3. Geometric Dimensioning and Tolerancing

4. Analysis of constraints (requirement) of manufacture (Dimensional & geometric)
5. Transfers the dimensions

❖ **MEM 114: Materials and Applied Mechanics**

➤ **Materials science I: 2 credits (30 hours); L, T, P, SPW**

1. General properties of metals used in mechanical construction
2. The ores
3. Metallurgy of iron and its alloys
4. the cast iron
5. Carbon steels
6. Light metals and their alloys
7. Heavy metals and their alloys
8. Crystal structure
9. Heat treatment of steels
10. Standard designation of metals

➤ **Applied Mechanics I: 3 credits (45 hours); L, T, P, SPW**

1. Study/ Modelling of Linkages (types of contacts, definition of ideal linkages)
2. Modelling and parametrizing of ideal linkages (notion of degree of freedom, parametrizing of ideal linkage)
3. Study of ideal linkages (All Eleven basic linkages)
4. Torques of Mechanical Actions
5. Fundamental Principle of Static
6. Graphical static
7. Static in space by the torques
8. Friction
9. Structures

❖ **MEM 115: Maintenance and automation**

➤ **Industrial maintenance: 3 credits (45 hours); L, T, P, SPW**

1. Organization of the maintenance
2. Study of the behavior of the hardware
3. The methods of maintenance
4. Preventive maintenance
5. The components
6. Fault finding procedure
7. Maintenance of mechanical equipment
8. Vibration analysis
9. Maintenance and Security
10. Technology and electrical maintenance
11. Instrumentation and Measurement

➤ **Automation I: 3 credits (45 hours); L, T, P, SPW**

1. Generality on automatism
2. Numeration and coding,
3. Binary and booleans algebra,
4. Combinatory logical function,
5. Simplification of logic functions (karnaugh map)
6. Technological elements of realization of logic function (logicgates)
7. Combinational and sequential logics
8. Technology of components
9. Sources of energy
10. Combinatory system
11. GRAFCET
12. GEMMA
13. Pneumatic realization of a sequencer
14. Micro programmable sequencers and programmable controller
15. Automatism with the programmable controller

❖ **MEM 116: Engineering drawing and design**

➤ **Analysis and design drawing I: 3 credits (45 hours); L, T, P, SPW**

1. Engineering graphics as a language
2. A few definitions relating to the technical drawing
3. General rule of representation of a technical drawing
4. Representation of the views of an object (projection)
5. Representation of a tapped hole or not, blind or leading (through)
6. basic dimensioning of a detail drawing
7. pictorial drawings

❖ **MEM 117: Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
 - How to introduce oneself
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;
- Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**

- Vocabulaire technique usuel

2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ MEM 121: Engineering Mathematics II and Fluid Mechanics

➤ Engineering Mathematics II: 5 credits (75 hours); L, T, 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.

Statistics and Probability

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

➤ Fluids Mechanics

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 functions for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ MEM122: Workshop supervisor Management

➤ Workshop supervisor Management: 4 credits (60 hours); L, T, P, SPW

Objectives: Understand workshop supervision, Understand loading and Schedules, describe workshop staff **organization**, differentiate the basic types of organization structure, Understand the responsible of technical adviser schedules, Understand the concept of planning and control, Understand the use of time sheet, Understand the capital expenditure budget proposal, Understand direct costs and indirect costs, Understand human relations & industrial psychology, Understand the concept of Motivation.

Contents: workshop supervision, loading and Schedules, basic types of organization structure, responsible of technical adviser schedules, concept of planning and control, use of time sheet, capital expenditure budget proposal, direct costs and indirect costs, human relations & industrial psychology, concept of Motivation.

❖ MEM 123: Mechanical analysis

➤ Analysis and design drawing II: 2 credits (30 hours); L, T, P, SPW

1. Pictorial drawings
2. Sections
3. The element of assembling
4. Mechanical link
5. Intersection
6. Introduction to the assembly drawings

➤ Analysis of manufacture II: 3 credits (45 hours); L, T, SPW

1. Studies of graphs
2. The ISO system of tolerances and adjustment
3. Study of surface
4. Write the first draft of the study of manufacture
5. Elaboration of a phase study

❖ MEM 124: Computer Aided Drawing (CAD)

➤ CAD (AUTOCAD): 4 credits (60 hours); L, T, P, SPW

1. Reminder on the essential commands of the Windows operating system
2. Presentation of the Autocad interface and starting the software
3. Study of the systems of coordinates (absolute, relative and polar)
4. Study of the Bars of drawing tools and parameterization of Autocad
5. Study of the tools of creation of objects or entities
6. Edition of a drawing
7. Creation, insertion of the layers of the lines and attribute of Blocks
8. Dimensional and of geometric drawing
9. Application on the detail drawings and assembly drawings
10. Isometric projection
11. Creation of the layers of lines and printing
12. Rapid methods of drawing on 2D
13. Drawing of the Assembly elements
14. Rapid methods of assembly drawings
15. Control of 3D drawing
16. Editing Command of 3D drawing
17. Rapid methods of 3D drawing

❖ MEM 125: Technology and practical of mechanical manufacturing I

➤ P manufacture I: 3 credits (45 hours); L, T, P, SPW

1. Bench work
2. TURNING (execution of external turning operations, taper turning, facing, execution of internal turning operations: drilling, boring, multi start threading, usage of turning mounting (false plate, angle plate)

3. MILLING: universal dividing head , milling of spur gears, usage of circular plate, gear milling, helical milling, cams milling, manufacturing of micro projects)

❖ **MEM 126: Computer Aided Manufacturing (CAM)**

➤ **Computer Aided Manufacturing I: 3 credits (45 hours); L, T, P, SPW**

1. General information
2. System of axis, Origins
3. Write programs
4. Study of the different functions and programming
5. The machining cycles

❖ **MEM 127: Computer for Business I / Civic and Moral Education**

➤ **Computer for Business I: 1 credit (15 hours)**

1. Generalities, impact of computer on society, current notions, basic hardware, software and networking
2. Procedures in using computer systems
3. Practical approach - hands- on
4. MS word; -MS excel; -MS power point; -Ms access

➤ **Civic and moral education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property and collective's goods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- 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

❖ MEM 231: Engineering Mathematics III, Legal and Economics Environment

➤ Engineering Mathematics III : 4 credits (60 hours); L, T, 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

➤ Legal and Economics Environment

1. Introduction to law -fundamental rights -Cameroon political history, re-unification, division of power, political and administrative institutions
2. The democratic process, political parties, civil society, pressure groups, local government, nation building, government budgeting
3. Managing debt crises, foreign aids, foreign policy, Cameroon and her neighbors, politics and trade.

❖ MEM 232: Computer for Business II and Computer Programming

Objectives: at the end of this courses students should achieve knowledge and practical know-how related to computer concepts and programming

➤ Computer for Business II: 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

➤ Computer Programming: 2 credits (30 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

❖ MEM 233: Mechanical Analysis II

➤ Analysis and design drawing III: 3 credits (45 hours); L, T, SPW

1. Tolerances and adjustments
2. Methods for the analysis and design of a product
3. Mechanical link and calculation of functional dimensions
4. Assembly, geometric dimensioning and tolerancing
5. Bearings
6. Lubricants and seals
7. Power transmissions

➤ **Analysis of manufacture III: 2 credits (30 hours); L, T, SPW**

1. Work led to consolidation of the program half-year I
2. Studies of geometric transfers
3. Study of simulation of machining
4. The elaboration of a preliminary draft study of manufacture by the analytical method
5. Work process elaboration

❖ **MEM 234: CAM – CAD (Computer Aided Manufacturing -Computer Aided Drawing I)**

➤ **Computer Aided Manufacturing II: 3 credits (45 hours); L, T, P, SPW**

1. Special Functions
2. verifications of the programs
3. Coding and Description
4. Programming of the tool
5. Programming of the movements
6. Machining Cycles

➤ **CADI (SOLIDWORK): 2 credits (30 hours); L, P, SPW**

1. Presentation of the software
2. The tools of sketch drawings and application
3. Basic function

❖ **MEM 235: Non Conventional Machining**

➤ **Technology of machining processes not conventional: 3 credits (45 hours); L, T, SPW**

1. Generality
2. Electrochemical machining (ECM)
3. Wire electrical discharge machining (WEDM)
4. Electrical discharge machining (EDM)
5. electroforming
6. abrasive water jet machining (AWJM)
7. Water jet machining (W JM)
8. Abrasive jet machining (AJMà (using air, sand or beads)
9. Chemical machining (CM)
10. Powder Metallurgy

❖ **MEM 236: P Technology and practical of mechanical manufacturing II**

➤ **Manufacturing P II: 5 credits (75 hours); L, P, SPW**

1. The work of turning(internal thread, Trapezoidal Thread, Thread to two inputs)
2. The work of milling (WORM GEAR, TOOTHED GEAR)
3. Special operations on the milling machine (drilling and bore)

❖ MEM 237: Environmental Engineering and Entrepreneurship

➤ Environmental Engineering: 2 credits (30 hours)

General objectives

Understand the various types of Environmental pollution and their effects on the environment, Understand various types of pollution, Know the generation of liquid wastes, Understand the methods of onsite handling storage and processing of liquid and solid waste, Know the method of solid and liquid waste collection, Understand the methods of transfer and transport of solid and liquid wastes, Understand the methods and equipment for solid and liquid waste processing, Understand the source and utilization of various forms of energy from the waste materials, Understand the source and utilization of various forms of energy from the waste materials, Understand the steps in implementing Environmental Standards.

Content

types of Environmental pollution and their effects on the environment, types of pollution, generation of liquid wastes, methods of onsite handling storage and processing of liquid and solid waste, method of solid and liquid waste collection, methods of transfer and transport of solid and liquid wastes, methods and equipment for solid and liquid waste processing, source and utilization of various forms of energy from the waste materials, source and utilization of various forms of energy from the waste materials, steps in implementing Environmental Standards.

➤ Entrepreneurship: 1 credit (15hours);

1. Generalities on enterprise
2. Wealth creation and how to make money
3. Evaluate the state of enterprise
4. Analyses of the activities of enterprise
5. Analyses of the cost effectiveness of an enterprise
6. Analyses of the structure of an enterprise
7. Analyses of the treasury of an enterprise
8. Budgeting
9. Elements of analytical accounting and management
10. Creating an Enterprise
11. Business plan

❖ MEM 241: Engineering Mathematics IV

➤ Engineering Mathematics IV: 4 credits (60 hours); L, T, SPW

1. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
2. special functions (basal function, splines and legendre)
3. statistical and numerical methods, statistics and probability
4. numerical analysis, series and sequences, linear programming

❖ MEM 242: Physics and chemistry

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

A- Mechanics

1. Kinematics

- Introduction;
- Repository system and position vector;
- Speed and acceleration;
- Movement in the field of gravity.

2. Action of forces on a material point

- Principle of inertia and fundamental principle of dynamics;
- The superposition of forces;
- The forces of inertia;
- Friction and frictional forces.

3. Gravitation

- The force of gravity;
- Law of gravitation;
- Fields of forces.

4. Work, power, energy and momentum

- Work;
- Power;
- Energie;
- Momentum

5. Action of the forces on a solid body

- Statics;
- Kinetics of solid bodies.

6. Fluid Mechanics

- Fluid and gas at rest;
- The flow of incompressible liquid.

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

1. Structure of Matter
2. Chemical analysis
3. Chemical Notation Introduction
4. Chemical reaction and chemical equation
5. The refrigerants
6. The refrigerated oils
7. Chemistry and the environment: impacts of fluids and substances used in cold and air conditioning on the environment
8. Food Microbiology
9. Methods of conservation
10. Optimal condition for the refrigerated storage

11. Conservation of animal and plant products

❖ **MEM 243: Mechanics and Materials**

➤ **Applied Mechanics I: 3 credits (45 hours); L, T, SPW**

1. Hypothesis of rdm
2. Simple composed solicitations
3. Simple bending, torsion
4. Mix or compose stresses

➤ **Materials Science II: 3 credits (45 hours); L, T, SPW**

1. Study of the iron diagram carbon (determination of the composition of the phases. Determination of the proportion (in mass) of each of the phases)
2. Thermochemical treatment of steels
3. Standard designation of metals
4. Mechanical testing of materials
5. Manufacture of raw materials
6. Thermal Analysis
7. TTT Diagram and solidification of binary alloys

❖ **MEM 244: Computer Aided Design (CAD) II**

➤ **CAD II (SOLIDWORK): 3 credits (45 hours); L, P, SPW**

1. Assembling of the Elements
2. Development plan of the drawings
3. The nomenclatures and tables
4. Creation of Projects

❖ **MEM 245: Jigs and fixtures and automation**

➤ **Jigs and fixtures: 2 credits (30 hours); L, T, SPW**

1. Jigs and fixture design
2. Drill jig components
3. Dimensioning jig drawings
4. Fixtures
5. Reminder of the standards of Assembly elements
6. Calculation of centering and locating
7. Calculation of blocking effects
8. Calculation of the diameter of the supports
9. Modular standar jigs and fixtures
10. Design of a mounting of drilling (tool guiding, indexing)
11. Design of a mounting of turning
12. Design of a mounting of milling
13. Design of a mounting of sawing
14. Analyse and propose the solution to ameliorate the defects of the jigs and fixture

➤ **Automation II: 2 credits (30 hours); L, T, P, PW**

1. Grafcet with selection of Sequence
2. Concept of macro-step & Sub-program
3. The programmable logic controllers pl7-1 and PL7-2
4. Study of the TSX PLC-21
5. Concept on the pneumatic sequencer
6. Pneumatic wiring and electro pneumatic

❖ **MEM 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

❖ **MEM 247: Industrial Safety / Engineering Management law and Economics**

➤ **Industrial safety 1 credit: (15 hours); L, T, P, SPW**

General objective:

Understand the importance of safety in industry, Know the causes and ways of preventing industrial accidents not caused by Fire, Appreciate what is involved in safety inspection, Appreciate the various causes and fire prevention in industry, Know the various methods and proceedings in firefighting, Appreciate the factories act and the principals involved in factory law.

Contents:

importance of safety in industry, causes and ways of preventing industrial accidents not caused by Fire, involvement of safety inspection, causes and fire prevention in industry, methods and proceedings in firefighting, factories act and the principals involved in factory law.

➤ **Engineering Management Law and Economics: 2 credits (30 hours); L, T, P, SPW**

Objectives: at the end of this course students should;

- understand basic principles, technics and practice of management, entrepreneuriatship law and economics

1. **Engineering Management Law And Economics**

- forecasting, planning, control, organization, coordination, motivation and communication
- Leadership, problem solving technics, human relation
- productivity, work flow, cost optimization, flow graphs
- work study, work measurement technics, incentives, wages, quality control, site meetings and organizational structure
- Use of planning tools (PERT, GANTT etc) with applications

2. **Engineering Economics and Law**

- Annual/present/net worth and rate of returns
- depreciation and amortization
- method of recording transactions, financial statement and balance sheet
- assets, liability, and long term capitals
- process of establishing forms
- labor unions
- termination of engineering contracts
- partnership
- business ownership
- arbitration
- breech of contract and liquidated damages

➤ **Labour Law: 1 credit (15 hours); L, T**

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 : MECHANICAL ENGINEERING

Specialty :

MECHANICAL CONSTRUCTION

1. The objective of the training

This specialty aims at training technicians who will work in automobile, aviation, mechanical, electric, capital good, arms, pharmaceutical, biotechnology industries for the design of predominantly mechanical products (construction machines, engine parts, gear boxes, capital and consumption goods...)

2. Research Skills

→ Generic skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of the mechanical construction and manufacturing sectors.

→ Specific skills

- Carrying out maintenance operations;
- Organising maintenance activities;
- Modeling of workpieces to be produced;
- Designing of prototypes, evaluation of associated cost, carrying out product control and testing before its launching on the production line;
- Knowledge of the various technical solutions enabling the creation of a product corresponding exactly to predefined needs
- Carrying out necessary calculations and mastering technical drawing using a computer (CAD).
- Conducting and supervising intervention groups.

3. Career opportunities

- Authorized dealer (concession),
- Authorised Repairer (trademark agent)
- Integrated circuit designer ;
- Technical catalog designer;
- Design office Technician for automobile, aviation industries,...

4. Organization of the Teachings

• FIRST SEMESTER

Field: Mechanical Engineering		Specialty: Mechanical Construction					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEC111	Engineering Mathematics I	40	30	0	5	75	5
MEC112	Engineer in the Society	40	15	0	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MEC113	Mechanical manufacture	40	20	12	3	75	5
MEC114	Materials and Applied Mechanics	50	20	0	5	75	5
MEC115	Maintenance and automation	40	10	20	5	75	5
MEC116	Analysis and design drawing	25	15	0	5	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEC117	Bilingual training	25	15	0	5	45	3
Total		260	125	32	33	450	30

• SECOND SEMESTER

Field: Mechanical Engineering		Specialty: Mechanical Construction					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEC121	Engineering Mathematics II and Fluids Mechanics	30	25	0	5	60	4
MEC122	Workshop Supervisor management	30	20	20	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
MEC123	Mechanical Analysis I	45	25	0	5	75	5
MEC124	Computer Assisted Drawing (CAD)	25	10	20	5	60	4
MEC125	Work Manufacturing Practice	10	0	45	5	60	4
MEC126	Computer aided Design (SOLIDWORK)	25	10	35	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEC127	Computer for business I/ Civic and Moral Education	30	15	0	0	45	3
Total		195	105	120	30	450	30

• **THIRD SEMESTER**

Field: Mechanical Engineering		Specialty: Mechanical Construction					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEC231	Engineering Mathematics III, Legal and Economic Environment	40	30	0	5	75	5
MEC232	Computer for Business I and Computer programming	20	25	10	5	60	4
Professional courses 60% (4 UC) 18 credits 270 hours							
MEC233	Mechanical Analysis II	45	25	0	5	75	5
MEC234	Materials	30	20	5	5	60	4
MEC235	Computer Aided Manufacturing	25	10	50	5	90	6
MEC236	Applied Mechanics	30	12	0	3	45	3
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEC237	Environmental Engineering and Entrepreneuriatship	25	15	0	5	45	3
Total		215	137	65	33	450	30

• **FOURTH SEMESTER**

Field: Mechanical Engineering		Specialty: Mechanical Construction					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
MEC241	Engineering Mathematics IV	30	25	0	5	60	4
MEC242	Physics and chemistry	25	20	25	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
MEC243	Applied Mechanics and Strength of material	40	30	0	5	75	5
MEC244	Drawing and automation	30	15	10	5	60	4
MEC245	Computer Aided Manufacturing	30	12	0	3	45	3
MEC246	Academic Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
MEC247	Industrial Safety/ Engineering Management Law and Economics	25	15	0	5	45	3
Total		180	117	95	58	450	30

5. Course content

❖ MEC 111: Engineering Mathematics I

➤ Engineering Mathematics I: 5 credits (75 hours); L, T, SPW

Objectives: at the end of this course the student should understand basic equations-master, numerical methods solve statistical problems

- Linear equation, differentiation, integration, geometric equations
- Differentiation: Role's theorem and the mean-value theorems, Taylor's theorem, Repeated Differentiation, Applications for Differentiation, Indeterminate form; Vector algebra and its application.
- Laplace, Fourier, partial differentiation equations, arbitrary constants and arbitrary functions, -partial differential equations, boundary value problems.

❖ MEC 112: Engineer in the society

➤ Engineer in the Society: 4 credits (60 hours); L, T, P, SPW

1. Introduction
2. Historical evolution of engineering
3. Career orientation on various engineering fields
4. Initiation and interpretation of administrative letters
5. Engineering and environmental pollution
6. Managing change
7. Organizational behavior, positive self-talk, managing stress
8. The industry and industrial psychology
Engineering contracts
9. Tendering for public contracts
10. Specifications writing
11. Law (tort, contract)
12. Organizational set up
13. Setting up an enterprise

❖ MEC 113: Mechanical Manufacture

➤ Manufacturing technology: 3 credits (45 hours); L, T, P, SPW

1. turning
2. milling
3. abrasive machining
4. machining time
5. Broaching
6. Slotting
7. Metrology.

➤ **Analysis of manufacture I: 2 credits (30 hours); L, T, SPW**

1. Organization chart a manufacturing workshop
2. positioning and maintaining
3. Geometric Dimensioning and Tolerancing
4. Analysis of constraints of manufacture (Dimensional & geometric)
5. Transfers the dimensions

❖ **MEC114: Materials and Applied Mechanics**

➤ **Materials science I: 2 credits (30 hours); L, T, SPW**

1. General properties of metals used in mechanical construction
2. The ores
3. Metallurgy of iron and its alloys
4. the cast iron
5. Carbon steels
6. Light metals and their alloys
7. Heavy metals and their alloys
8. Crystal structure
9. Heat treatment of steels
10. Standard designation of metals

➤ **Applied Mechanics I: 3 credits (45 hours); L, T, SPW**

1. Types of connections
2. Study/Modelling Of Linkages (types of contacts, definition of ideal linkages)
3. Modelling And Parametrizing of Ideal Linkages (notion of degree of freedom, parametrizing of ideal linkage)
4. Study of Ideal Linkages (All Eleven basic linkages)
5. Torques of Mechanical Actions
6. Fundamental Principle of Static
7. Graphical statico
8. Static in space by the torques
9. Friction
10. Structures

❖ **MEC 115: Maintenance and automatism**

➤ **Industrial maintenance: 3 credits (45 hours); L, P, SPW**

1. Organization of the maintenance
2. Study of the behavior of the hardware
3. The methods of maintenance
4. Preventive maintenance The components
5. Fault finding procedure
6. Maintenance of mechanical equipment
7. Vibration analysis
8. Maintenance and Security

9. Technology and electrical maintenance
10. Instrumentation and Measurement

➤ **Automation I: 3 credits (45 hours; L, T, P, SPW)**

1. Generality on automatism
2. Numeration and coding,
3. Binary and booleans algebra,
4. Combinatory logical function,
5. Simplification of logic functions (karnaugh map)
6. Technological elements of realization of logic function (logicgates)
7. Combinational and sequential logics
8. Technology of components
9. Sources of energy
10. Combinatory system
11. GRAFCET
12. GEMMA
13. Pneumatic realization of a sequencer
14. Micro programmable sequencers and programmable controller
15. Automatism with the programmable controller

❖ **MEC 116: Engineering drawing and design**

➤ **Analysis and design drawing I : 3 credits (45 hours); L, T, SPW**

1. Engineering graphics as a language
2. A few definitions relating to the technical drawing
3. General rule of representation of a technical drawing
4. Representation of the views of an object (projection)
5. Representation of a tapped hole or not, blind or leading (through)
6. basic dimensioning of a detail drawing
7. pictorial drawings

❖ **MEC 117: Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
 - How to introduce oneself
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;
- Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**

- Vocabulaire technique usuel

2. **Grammaire**

- Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;
- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des texts de nature diverses (littéraire, non littéraire,image fixe ou mobile, dessin de presse,carricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ MEC 121: Engineering Mathematics II and Fluid Mechanics

➤ Engineering Mathematics II: 5 credits (75 hours); L, T, 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.

Statistics and Probability

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

➤ Fluids Mechanics

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 functions for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ MEC 122: Workshop supervisor Management

➤ Workshop supervisor Management: 4 credits (60 hours); L, T, P, SPW

Objectives: Understand workshop supervision, Understand loading and Schedules, describe workshop staff **organization**, differentiate the basic types of organization structure, Understand the responsible of technical adviser schedules, Understand the concept of planning and control, Understand the use of time sheet, Understand the capital expenditure budget proposal, Understand direct costs and indirect costs, Understand human relations & industrial psychology, Understand the concept of Motivation.

Contents: workshop supervision, loading and Schedules, basic types of organization structure, responsible of technical adviser schedules, concept of planning and control, use of time sheet, capital expenditure budget proposal, direct costs and indirect costs, human relations & industrial psychology, concept of Motivation.

❖ **MEC123: Mechanical Analysis I**

➤ **Analysis and design drawing II: 2 credits (30 hours); L, T, SPW**

1. basic dimensioning
2. pictorial drawings
3. sections
4. The element of assembly
5. mechanical links

➤ **Analysis of manufacture II: 3 credits (45 hours); L, T, SPW**

1. Studies of graphs
2. The ISO system of tolerances and adjustment
3. Study of surface states
4. Write the first draft of the study of manufacture
5. Elaboration of a phase study

❖ **MEC 124: Computer Aided Drawing (CAD)**

➤ **CAD (AUTOCAD): 4 credits (60 hours); L, T, P, SPW**

1. Reminder on the essential commands of the Windows operating system
2. Presentation of the Autocad interface and starting the software
3. Study of the systems of coordinates (absolute, relative and polar)
4. Study of the Bars of drawing tools and parameterization of Autocad
5. Study of the tools of creation of objects or entities
6. Edition of a drawing
7. Creation, insertion of the layers of the lines and attribute of Blocks
8. Dimensional and of geometric drawing
9. Application on the detail drawings and assembly drawings
10. Isometric projection
11. Creation of the layers of lines and printing
12. Rapid methods of drawing on 2D
13. Drawing of the Assembly elements
14. Rapid methods of assembly drawings
15. Control of 3D drawing
16. Editing Command of 3D drawing
17. Rapid methods of 3D drawing

❖ **MEC 125: Technology and practical of mechanical manufacturing I**

➤ **P manufacture I: 3 credits (45 hours); L, T, P, SPW**

1. Bench work
2. TURNING (execution of external turning operations, taper turning, facing, execution of internal turning operations: drilling, boring, multi start threading, usage of turning mounting (false plate, angle plate)

3. MILLING: universal dividing head , milling of spur gears, usage of circular plate, gear milling, helical milling, cams milling, manufacturing of micro projects)

❖ **MEC 126: Computer Aided Design (SOLIDWORK)**

➤ **CAD (SOLIDWORK): 5 credits (75 hours); L, T, P, SPW**

1. Presentation of the software
2. The tools of sketch drawings and application
3. Basic function
4. Assembling of the Elements
5. Development plan of the drawings
6. The nomenclatures and tables
7. Creation of Projects

❖ **MEC 127: Computer for Business I /Civic and Moral Education**

➤ **Computer for Business I: 1 credit (15 hours)**

1. Generalities, impact of computer on society, current notions, basic hardware, software and networking
2. Procedures in using computer systems
3. Practical approach - hands- on
4. MS word; -MS excel; -MS power point; -Ms access

➤ **Civic and moral education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property and collective's goods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Ethics and management.
- Civics
- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- 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

❖ **MEC 231: Engineering Mathematics III, Legal and Economics Environment**

➤ **Engineering Mathematics III : 4 credits (60 hours); L, T, 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

➤ **Legal and Economics Environment**

1. Introduction to law -fundamental rights -Cameroon political history, re-unification, division of power, political and administrative institutions
2. The democratic process, political parties, civil society, pressure groups, local government, nation building, government budgeting
3. Managing debt crises, foreign aids, foreign policy, Cameroon and her neighbors, politics and trade.

❖ **MEC 232: Computer for Business II and Computer Programming**

Objectives: at the end of this courses students should achieve knowledge and practical know-how related to computer concepts and programming

➤ **Computer for Business II: 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

➤ **Computer Programming: 2 credits (30 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

❖ **MEC 233: Mechanical Analysis II**

➤ **Analysis and design drawing III: 3 credits (45 hours); L, T, SPW**

1. Tolerances and adjustments
2. Methods for the analysis and design of a product
3. Mechanical link and calculation of functional dimensions
4. Assembly, geometric dimensioning and tolerancing
5. Bearings
6. Lubricants and seals
7. Power transmissions

➤ **Analysis of manufacture III: 2 credits (30 hours); L, T, SPW**

1. Work led to consolidation of the program half-year I
2. Studies of geometric transfers
3. Study of simulation of machining
4. The elaboration of a preliminary draft study of manufacture by the analytical method
5. Work process elaboration

❖ **MEC 234: Materials**

➤ **Strength of materials I: 2 credits (30 hours); L, T, SPW—**

1. Solicitations Hooke's law
2. Simple stresses: Compression/tension, Simple shear, bending, torsion,
3. mix or compose stresses
4. notion of stresses and laws of behavior
5. hyperstatic system problem
6. Energy Methods and Finite Element Modeling, Design Office
7. Mechanical dimensioning
8. Assumptions of the resistance of materials

➤ **Materials Science II: 2 credits (30 hours); L, T, P, SPW**

1. Study of the iron diagram carbon (determination of the composition of the phases. Determination of the proportion (in mass) of each of the phases)
2. Thermochemical treatment of steels
3. Standard designation of metals
4. Mechanical testing of materials
5. Manufacture of raw materials
6. Thermal Analysis
7. TTT Diagram and solidification of binary alloys

❖ **MEC 235: CAM – Machining**

➤ **Computer Aided Manufacturing I: 2 credits (30 hours);—L, T, P, SPW**

1. General
2. Axis system, origins
3. Writing of programs
4. Study of the different functions and programming
5. The machining cycles

➤ **P machining II: 2 credits (30 hours);—L, T, P, SPW**

❖ **MEC 236: Applied mechanics**

➤ **Applied mechanics I: 3 credits (45 hours);—L, T, SPW**

1. Study/modelling of linkages
2. Torsors of mechanical actions

3. Basic principle of the static
4. graphicalStatic
5. Static in space by torsors
6. Kinematics
7. Kinematic torsor
8. Absolute and relative movements

❖ **MEC 237: Environmental Engineering and Entrepreneurship**

➤ **Environmental Engineering: 2 credits (30 hours)**

General objectives

Understand the various types of Environmental pollution and their effects on the environment, Understand various types of pollution, Know the generation of liquid wastes, Understand the methods of onsite handling storage and processing of liquid and solid waste, Know the method of solid and liquid waste collection, Understand the methods of transfer and transport of solid and liquid wastes, Understand the methods and equipment for solid and liquid waste processing, Understand the source and utilization of various forms of energy from the waste materials, Understand the source and utilization of various forms of energy from the waste materials, Understand the steps in implementing Environmental Standards.

Content

types of Environmental pollution and their effects on the environment, types of pollution, generation of liquid wastes, methods of onsite handling storage and processing of liquid and solid waste, method of solid and liquid waste collection, methods of transfer and transport of solid and liquid wastes, methods and equipment for solid and liquid waste processing, source and utilization of various forms of energy from the waste materials, source and utilization of various forms of energy from the waste materials, steps in implementing Environmental Standards.

➤ **Entrepreneurship: 1 credit (15hours);**

1. Generalities on enterprise
2. Wealth creation and how to make money
3. Evaluate the state of enterprise
4. Analyses of the activities of enterprise
5. Analyses of the cost effectiveness of an enterprise
6. Analyses of the structure of an enterprise
7. Analyses of the treasury of an enterprise
8. Budgeting
9. Elements of analytical accounting and management
10. Creating an Enterprise
11. Business plan

❖ **MEC 241: Engineering Mathematics IV**

➤ **Engineering Mathematics IV: 4 credits (60 hours); L, T, SPW**

1. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
2. special functions (basal function, splines and legendre)
3. statistical and numerical methods, statistics and probability
4. numerical analysis, series and sequences, linear programming

❖ **MEC 242: Physics and Chemistry**

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

A- Mechanics

1. **Kinematics**
 - Introduction;
 - Repository system and position vector;
 - Speed and acceleration;
 - Movement in the field of gravity.
2. **Action of forces on a material point**
 - Principle of inertia and fundamental principle of dynamics;
 - The superposition of forces;
 - The forces of inertia;
 - Friction and frictional forces.
3. **Gravitation**
 - The force of gravity;
 - Law of gravitation;
 - Fields of forces.
4. **Work, power, energy and momentum**
 - Work;
 - Power;
 - Energie;
 - Momentum
5. **Action of the forces on a solid body**
 - Statics;
 - Kinetics of solid bodies.
6. **Fluid Mechanics**
 - Fluid and gas at rest;
 - The flow of incompressible liquid.

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

1. Structure of Matter
2. Chemical analysis
3. Chemical Notation Introduction
4. Chemical reaction and chemical equation

5. The refrigerants
6. The refrigerated oils
7. Chemistry and the environment: impacts of fluids and substances used in cold and air conditioning on the environment
8. Food Microbiology
9. Methods of conservation
10. Optimal condition for the refrigerated storage
11. Conservation of animal and plant products

❖ **MEC 243: Applied mechanics and strength of material**

➤ **Strength of material II: 2 credits (30 hours); L, T, P, PW**

1. Model and dimension a beam subjected to bending
2. torsion, deflection of the beam
3. notion of stresses
4. Use and understand the criteria of elastic resistance
5. Choose a factor of safety
6. Calculate contact pressures in simple cases

➤ **Applied mechanics II: 3 credits (45 hours); L, T, SPW**

1. Equation of motion for a rigid body
2. Angular momentum of a rigid body in motion
3. Plane motion
4. System of bodies
5. Constrained plane motion
6. Energy and momentum methods
7. Principle of work and energy
8. Work forces acting on a rigid body
9. Kinetic energy of a rigid body in plane motion
10. System of bodies
11. Conservation of energy
12. Power
13. Impulse and momentum for the plane motion

❖ **MEC 244: Drawing and automation**

➤ **Analysis and design drawing IV: 3 credits (45 hours); L, T, SPW**

1. Tolerances and adjustments
2. Methods for the analysis and design of a product
3. Mechanical link and calculation of functional dimensions
4. Assembly, geometric dimensioning and tolerancing
5. Bearings
6. Lubricants and seals
7. Power transmissions

➤ **Automation III: 3 credits (45 hours); L, T, SPW**

1. PL7-1 and PL7-2 Programmable Logic Controllers
2. Study of the TSX-21 to 47 PLC
3. Concept on the pneumatic sequencer
4. Pneumatic and electropneumatic

❖ **MEC 245: Computer Aided Manufacturing (CAM) II**

➤ **Computer Aided Manufacturing II: 3 credits (45 hours); L, T, SPW**

1. Special functions
2. Verification of programs
3. Coding and designation
4. Programming the tool
5. Programming of movements
6. Machining cycles

❖ **MEC 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

❖ **MEC 247: Industrial Safety / Engineering Management law and Economics**

➤ **Industrial safety 1 credit: (15 hours); L, T, P, SPW**

General objective:

Understand the importance of safety in industry, Know the causes and ways of preventing industrial accidents not caused by Fire, Appreciate what is involved in safety inspection, Appreciate the various causes and fire prevention in industry, Know the various methods and proceedings in firefighting, Appreciate the factories act and the principals involved in factory law.

Contents:

importance of safety in industry, causes and ways of preventing industrial accidents not caused by Fire, involvement of safety inspection, causes and fire prevention in

industry, methods and proceedings in firefighting, factories act and the principals involved in factory law.

➤ **Engineering Management Law and Economics: 2 credits (30 hours); L, T, P, SPW**

Objectives: at the end of this course students should;

- understand basic principles, technics and practice of management, entrepreneurship law and economics

1. **Engineering Management Law And Economics**

- forecasting, planning, control, organization, coordination, motivation and communication
- Leadership, problem solving technics, human relation
- productivity, work flow, cost optimization, flow graphs
- work study, work measurement technics, incentives, wages, quality control, site meetings and organizational structure
- Use of planning tools (PERT, GANTT etc) with applications

2. **Engineering Economics and Law**

- Annual/present/net worth and rate of returns
- depreciation and amortization
- method of recording transactions, financial statement and balance sheet
- assets, liability, and long term capitals
- process of establishing forms
- labor unions
- termination of engineering contracts
- partnership
- business ownership
- arbitration
- breach of contract and liquidated damages

➤ **Labour Law: 1 credit (15 hours); L, T**

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 : MECHANICAL ENGINEERING

Specialty :

BOILER MAKING AND WELDING

1. The objective of the training

The boilermaking and welding aims at training senior technicians mastering the design, preparation, manufacture, control, the installation and maintenance industrial boilerwork: tanks of chemical industries, wagon, boilers of thermal power plant, shipbuilding, avionics, road infrastructure, railway.

2. Research Skills

→ Generic skills

- Work independently, collaborate as a team;
- Analysis and synthesis of professional documents (French, English);
- Oral, written and corporate communication skills within and without (French, English);
- Participate /engage in the management of the project;
- Know and make use of professional networks and institutions of boilermaking sectors.

→ Specific skills

- Designing and implementation of metal assembly plans;
- Mastery of metal assembly and welding techniques (welding, pointing, clip Rivet, glue,...);
- Mastery of metal cutting (plates, tubes, metal profile);
- Giving the desired shape to the element through bending, bowing, roll bending, planishing, cupping...
- Ensuring the maintenance of damaged facilities.

3. Career opportunities

- Aeronautics Boilermaker
- Stainless steel boilermaker on ;
- Technician;
- Industrial boilermaker technician;
- pipefitter.

4. Organization of the Teachings

• FIRST SEMESTER

Field: Mechanical Engineering		Specialty: Boilermaking and Welding					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
BOW111	Engineering Mathematics I	30	25	0	5	60	4
BOW112	Engineer in the Society	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BOW113	Methods and jigs and fixtures	35	20	0	5	60	4
BOW114	Practice of welding	10	0	60	5	75	5
BOW115	Technology and Materials	40	30	0	5	75	5
BOW116	Marking out I	25	15	15	5	60	4
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BOW117	Bilingual training	25	17	0	3	45	3
Total		195	132	90	33	450	30

• SECOND SEMESTER

Field: Mechanical Engineering		Specialty: Boilermaking and Welding					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
BOW121	Engineering Mathematics II and Fluid Mechanics	30	25	0	5	60	4
BOW122	Workshop supervisor Management	35	20	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BOW123	Analysis and Design of metal structures	35	20	0	5	60	4
BOW124	Design of sheet metal structures	15	10	30	5	60	4
BOW125	Metallurgy I	30	25	15	5	75	5
BOW126	Computer aided drawing (Autocard)	20	15	35	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BOW127	Computer for business I / Civic and Moral Education	27	15	0	3	45	3
Total		192	130	95	33	450	30

• **THIRD SEMESTER**

Field: Mechanical Engineering		Specialty: Boilermaking and Welding					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
BOW231	EngineeringMathematics III	30	25	0	5	60	4
BOW232	Computer for business and computer programming	30	25	15	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BOW233	numerical control and costs estimation	30	30	10	5	75	5
BOW234	Methods and jigs and fixtures II	27	15	0	3	45	3
BOW235	CAD and metallurgy II	35	20	15	5	75	5
BOW236	Metrology	20	5	45	5	75	5
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BOW237	Environmental Engineering and Enterpreneuriaship	27	15	0	3	45	3
Total		199	135	85	31	450	30

• **FOURTH SEMESTER**

Field: Mechanical Engineering		Specialty: Boilermaking and Welding					
Course Code	Course titles	Number of hours					Number Of Credits
		L	T	P	SPW	Total	
Fundamental Courses 30% (2 UC) 9 credits 135 hours							
BOW241	Engineering Mathematics IV	30	25	0	5	60	4
BOW242	Physics and chemistry	20	10	40	5	75	5
Professional courses 60% (4 UC) 18 credits 270 hours							
BOW243	marking out II and sheet metal	25	0	45	5	75	5
BOW244	CFAO and digital control numerical control and CAM	25	10	20	5	60	4
BOW245	Analysis and Design II	22	20	0	3	45	3
BOW246	Academic Internship	0	0	60	30	90	6
Transversal Courses 10% (1 UC) 3 credits 45 hours							
BOW247	Industrial safety /Engineering Management Law and Economics	27	15	0	3	45	3
Total		149	80	165	56	450	30

5. Course content

❖ BOW 111: Engineering Mathematics I

➤ Engineering Mathematics I: 5 credits (75 hours); L, T, SPW

Objectives: at the end of this course the student should understand basic equations-master, numerical methods solve statistical problems

- Linear equation, differentiation, integration, geometric equations
- Differentiation: Role's theorem and the man-value theorems, Taylor's theorem, Repeated Differentiation, Applications for Differentiation, Indeterminate form; Vector algebra and its application.
- Laplace, Fourier, partial differentiation equations, arbitrary constants and arbitrary functions, -partial differential equations, boundary value problems.

❖ BOW 112: Engineer in the society

➤ Engineer in the Society: 4 credits (60 hours); L, T, P, SPW

1. Introduction
2. Historical evolution of engineering
3. Career orientation on various engineering fields
4. Initiation and interpretation of administrative letters
5. Engineering and environmental pollution
6. Managing change
7. Organizational behavior, positive self-talk, managing stress
8. The industry and industrial psychology
Engineering contracts
9. Tendering for public contracts
10. Specifications writing
11. Law (tort, contract)
12. Organizational set up
13. Setting up an enterprise

❖ BOW 113: Methods and jigs and fixtures

➤ Methods and tooling machines and machine-tools I: 4 credits (60 hours); L, T, SPW

1. Definition of jigs and fixtures
 - Assembly Drawings
 - Detail Drawings
2. Design Principle of jigs and fixtures
3. Definition of the principle and of the general architecture
4. numerical control of all or part of the tooling including the features
5. Study of a systems
6. Study of machines of forging (by shock, by pressing, rolling mills, shears...)

7. Technology of the manufacture of fixtures
 - Achievement of the elements;
 - Assemble;
 - Mounting and finishing.
8. Achievement of tooling
 - Preparation (including computer aided manufacturing - FAO);
 - Implementation of the machine-tools;
 - Control of Conventional tooling...
9. Design of tooling
 - Search for technical solutions;
 - modeling;
 - Dimensionning
10. The drafting of a protocol of the receipt of the fixture

❖ **BOW 114: Practice of welding**

➤ **Practical work of conventional welding I: 5 credits (75 hours); L, P, SPW**

1. The cutting processes
2. The forming processes
3. Processes of thermal assembly
4. Processes for the mechanical assembly
5. Process of assembling
6. Destructive Control

❖ **BOW 115: Technology and materials**

➤ **Metallic materials: 2 credits (30 hours); L, T, SPW**

1. Classification of metallic and non-metallic materials
2. Dielectric Material
3. The thermal treatments for the welded assemblies
4. The treatments of protecting surfaces of the corrosion of metals and alloys.

➤ **Welding technology I: 3 credits (45 hours); L, T, SPW**

1. Preparation of parts to assemble
2. The different welding processes
3. The supports in ceramics
4. The working documents
5. Codification and normalized representation of welding
6. Concepts of Security
7. standards welding Control
8. The welding tests
9. The different processes of reloading of the parts
10. Design in the sheet metal
11. Design rules of frames subjected to static solicitations and/or cyclical
12. Choice of standard components (cylinder, gear motor)

❖ **BOW 116: Marking out**

➤ **Marking out I: 4 credits (60 hours); L, T, P, SPW**

1. Representation of elements in the space
2. Reading of the definition plan of the work to extract the dimensions of the elements.
3. Intersection of simple surfaces (neutral ligne penetration,)
4. Obtaining graph and by calculations the developments
5. The development of simple solid (cylinders, prisms, pyramids)
6. The elbows cylindrical and conical

❖ **BOW 117: Bilingual training**

➤ **English: 1.5 credits (22 hours 30mn)**

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
 - How to introduce oneself
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;
 - Lettre / memo writing and minutes of a meeting

➤ **French : 1.5 credits (22 hours 30mn)**

1. **Vocabulaire**
 - Vocabulaire technique usuel
2. **Grammaire**
 - Du verbe : Conjugaison aux temps communément utilisés – présent, passé composé ; imparfait, futur, conditionnel, et plus-que-parfait, l'impératif, l'infinitif, voix passive ;

- De l'adjectif : Qualificatif, possessifs, démonstratifs, interrogatifs, 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 d'un long texte;
- Lecture des textes de nature diverses (littéraire, non littéraire, image fixe ou mobile, dessin de presse, caricature ect...
- 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 ;
- Realisation d'un exposé, d'une interview...
- Gestion d'une table ronde/discussion : La prise de notes, la prise de parole
- Expressions figées

❖ **BOW 121: Engineering Mathematics II and Fluid Mechanics**

➤ **Engineering Mathematics II: 5 credits (75 hours); L, T, 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.

Statistics and Probability

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

➤ Fluids Mechanics

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 functions for flow in a uniform stream and due to source, sink and doublet and for simple combinations of these.

❖ BOW 122: Workshop supervisor Management

➤ Workshop supervisor Management: 4 credits (60 hours); L, T, P, SPW

Objectives: Understand workshop supervision, Understand loading and Schedules, describe workshop staff **organization**, differentiate the basic types of organization structure, Understand the responsible of technical adviser schedules, Understand the concept of planning and control, Understand the use of time sheet, Understand the capital expenditure budget proposal, Understand direct costs and indirect costs, Understand human relations & industrial psychology, Understand the concept of Motivation.

Contents: workshop supervision, loading and Schedules, basic types of organization structure, responsible of technical adviser schedules, concept of planning and control, use of time sheet, capital expenditure budget proposal, direct costs and indirect costs, human relations & industrial psychology, concept of Motivation.

❖ BOW 123: Analysis and design of metal structures I

➤ Analysis and design of metal structures I: 4 credits (60 hours); L, T, SPW

1. Technology

- Study of problems related to the cutting (calculation of the efforts of cutting, setting parameters);
- Electro deformations-plastics...

2. Piping

- Manufacturing and construction;
- Study of the prefabrication of a line of piping.

3. Manufacturing processes

- Cutting;
- Forming
- Completion;
- Assemble;
- Control;
- The materials...

❖ **BOW 124: Design of sheet metal structures**

➤ **P of sheet metal and technology I: 4 credits (60 hours); L, T, P, SPW**

1. Study of sheet metal element
2. Study of a piping
3. Study of sheet metal element project with light sheet

❖ **BOW 125: Metallurgy I**

➤ **Metallurgy I: 4 credits (60 hours); L, T, P, SPW**

1. The metallic material
2. The binary alloys
3. Iron diagram cementite
4. Weldability of non-alloy steel and weakly allies

❖ **BOW 126: Computer aided drawing (Autocad)**

➤ **Computer aided drawing (Autocad) I : 5 credits (75 hours); L, T, P, SPW**

1. dimensioning for a 2 axis, section lining and dimensioning
2. Edition of the nomenclatures
3. Representation of the element in the software

❖ **BOW 127: Computer for business I / Civic and Moral Education**

➤ **Computer for Business I: 1 credit (15 hours)**

1. Generalities, impact of computer on society, current notions, basic hardware, software and networking
2. Procedures in using computer systems
3. Practical approach - hands- on
4. MS word; -MS excel; -MS power point; -Ms access

➤ **Civic and moral education: 2 credits (30 hours); L, T**

The Concepts

- The citizen;
- The Nation;
- The State;
- Publics Property and collective's goods;
- The freedoms;
- The public service;
- Ethics;
- Ethics, Law and reason;
- Ethical Problem ;
- Ethics and management.
- Civics

- Deontology
- Moral consciousness
- The universal declaration of Human Rights
- Good governance in public services
- 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

❖ **BOW231: Engineering Mathematics III, Legal and Economics Environment**

➤ **Engineering Mathematics III : 4 credits (60 hours); L, T, 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

➤ **Legal and Economics Environment**

1. Introduction to law -fundamental rights -Cameroon political history, re-unification, division of power, political and administrative institutions
2. The democratic process, political parties, civil society, pressure groups, local government, nation building, government budgeting
3. Managing debt crises, foreign aids, foreign policy, Cameroon and her neighbors, politics and trade.

❖ **BOW 232: Computer for Business II and Computer Programming**

Objectives: at the end of this courses students should achieve knowledge and practical know-how related to computer concepts and programming

➤ **Computer for Business II: 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

➤ **Computer Programming: 2 credits (30 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

❖ BOW 233: Computer Aided Manufacturing and costs estimation

➤ Computer Aided Manufacturing I: 2 credits (30 hours); L, T, P, SPW

1. A comparative study between the traditional machines and machines with numerical control
2. Basic elements of a director of digital command
3. Geometric modeling of numerical control machine tools
4. Servo control in position and speed of a numeric axis
5. The different types of the position sensors
6. Glossary of instructions

➤ Costs Estimation : 3 credits (45 hours); L, T, PW

1. The direct expenses charges
2. Indirect charges and their treatment
3. The Prioritized costs
4. Partial costs
5. The margins and the results
6. Estimated Cost

❖ BOW 234: Methods and fixture II

➤ Methods, fixture and machine tools II: 3 credits (45 hours); L, T, SPW

1. **Technology of the manufacture of tools:**
 - Achievement of the elements ;
 - Assemble;
 - mounting and finishing.
2. **Achievement of tooling**
 - Preparation (including computer aided manufacturing);
 - Implementation of the machine-tools, control of conventional tooling...
3. **Design of fixture**
 - Search for technical solutions;
 - Modeling, dimensioning.
4. **The drafting of a protocol of the receipt of the fixture**

❖ BOW 235 : CAD and metallurgy II

➤ CAD II: 3 credits (45 hours); L, P, PW

1. Determination of developments or unfolded state using the software
2. Validation and exploitation of the results obtained
3. Realistic rendered
4. Animations

➤ Metallurgy II: 2 credits (30 hours); L, T, SPW

1. The BWRA methods and SEFERIAN
2. Energies welding - speed of cooling - TRC
3. The cracking

❖ **BOW 236: Metrology**

➤ **Metrology: 5 credits (75 hours); L, T, P**

1. Non Destructive Testing
2. Dimensioning, geometric dimensioning and tolerancing controls

❖ **BOW 237: Environmental Engineering and Entrepreneurship**

➤ **Environmental Engineering: 2 credits (30 hours)**

General objectives

Understand the various types of Environmental pollution and their effects on the environment, Understand various types of pollution, Know the generation of liquid wastes, Understand the methods of onsite handling storage and processing of liquid and solid waste, Know the method of solid and liquid waste collection, Understand the methods of transfer and transport of solid and liquid wastes, Understand the methods and equipment for solid and liquid waste processing, Understand the source and utilization of various forms of energy from the waste materials, Understand the source and utilization of various forms of energy from the waste materials, Understand the steps in implementing Environmental Standards.

Content

types of Environmental pollution and their effects on the environment, types of pollution, generation of liquid wastes, methods of onsite handling storage and processing of liquid and solid waste, method of solid and liquid waste collection, methods of transfer and transport of solid and liquid wastes, methods and equipment for solid and liquid waste processing, source and utilization of various forms of energy from the waste materials, source and utilization of various forms of energy from the waste materials, steps in implementing Environmental Standards.

➤ **Entrepreneurship: 1 credit (15hours);**

1. Generalities on enterprise
2. Wealth creation and how to make money
3. Evaluate the state of enterprise
4. Analyses of the activities of enterprise
5. Analyses of the cost effectiveness of an enterprise
6. Analyses of the structure of an enterprise
7. Analyses of the treasury of an enterprise
8. Budgeting
9. Elements of analytical accounting and management
10. Creating an Enterprise
11. Business plan

❖ **BOW 241: Engineering Mathematics IV**

➤ **Engineering Mathematics IV: 4 credits (60 hours); L, T, SPW**

1. Fourier series and transformations, Z-transform, partial differential equation, complex variables and mapping,
2. special functions (basal function, splines and legendre)
3. statistical and numerical methods, statistics and probability
4. numerical analysis, series and sequences, linear programming

❖ **BOW 242: Physics and Chemistry**

➤ **Physics I: 3 credits (45 hours); L, T, P, SPW**

A- Mechanics

1. **Kinematics**
 - Introduction;
 - Repository system and position vector;
 - Speed and acceleration;
 - Movement in the field of gravity.
2. **Action of forces on a material point**
 - Principle of inertia and fundamental principle of dynamics;
 - The superposition of forces;
 - The forces of inertia;
 - Friction and frictional forces.
3. **Gravitation**
 - The force of gravity;
 - Law of gravitation;
 - Fields of forces.
4. **Work, power, energy and momentum**
 - Work;
 - Power;
 - Energie;
 - Momentum
5. **Action of the forces on a solid body**
 - Statics;
 - Kinetics of solid bodies.
6. **Fluid Mechanics**
 - Fluid and gas at rest;
 - The flow of incompressible liquid.

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

1. Structure of Matter
2. Chemical analysis
3. Chemical Notation Introduction
4. Chemical reaction and chemical equation

5. The refrigerants
6. The refrigerated oils
7. Chemistry and the environment: impacts of fluids and substances used in cold and air conditioning on the environment
8. Food Microbiology
9. Methods of conservation
10. Optimal condition for the refrigerated storage
11. Conservation of animal and plant products

❖ **BOW 243: Marking out II and sheet metal**

➤ **Sheet metal : 3 credits (45 hours); L, P, SPW**

1. List of manufacturing operations and control (LOFC)
2. view of mounting
3. Scheduling of Phases
4. phases study
5. Control Sheet
6. Identification of the processes for the operations of:
 - cutting : contouring, nibbling, punching;
 - Forming: Folding, rolling, bending;
 - Assembly: beam and robot welding.

➤ **Marking out II: 2 credits (30 hours); L, P, SPW**

1. The geometric constructions
2. The projection (the point, line, the true length of the lines...)
3. The development of composed surfaces with parallel bases or concurrent
4. The research of intersections between solids (cylinder/cylinder, Cone/cylinder, cylinder/sphere) as well as the developments
5. The research of the dihedral angles (Angle of folding)
6. Tracing in the air on shaped parts.

❖ **BOW 244: Computer Aided Manufacturing and numerical control**

➤ **Numerical control machine tools and CFAO II: 4 credits (60 hours); L, T, P, SPW**

1. Programming in turning
2. Programming in milling
3. Modification of a machine language program
4. Drafting of shop orders (OF)

❖ **BOW 245: Analysis and design II**

➤ **Analysis and design of metal structure II: 3 credits (45 hours); L, T, SPW**

1. Setting parameters
2. Assemblage Constraints
3. Methods of Design: by piece, in the Assembly

4. Libraries and banks of technical data
5. Simple unfolded, developments of regulated surfaces

❖ **BOW 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

❖ **BOW 247: Industrial Safety / Engineering Management law and Economics**

➤ **Industrial safety 1 credit: (15 hours); L, T, P, SPW**

General objective:

Understand the importance of safety in industry, Know the causes and ways of preventing industrial accidents not caused by Fire, Appreciate what is involved in safety inspection, Appreciate the various causes and fire prevention in industry, Know the various methods and proceedings in firefighting, Appreciate the factories act and the principals involved in factory law.

Contents:

importance of safety in industry, causes and ways of preventing industrial accidents not caused by Fire, involvement of safety inspection, causes and fire prevention in industry, methods and proceedings in firefighting, factories act and the principals involved in factory law.

➤ **Engineering Management Law and Economics: 2 credits (30 hours); L, T, P, SPW**

Objectives: at the end of this course students should;

- understand basic principles, technics and practice of management, entrepreneurship law and economics

1. **Engineering Management Law And Economics**

- forecasting, planning, control, organization, coordination, motivation and communication
- Leadership, problem solving technics, human relation
- productivity, work flow, cost optimization, flow graphs
- work study, work measurement technics, incentives, wages, quality control, site meetings and organizational structure

- Use of planning tools (PERT, GANTT etc) with applications
- Annual/present/net worth and rate of returns
- depreciation and amortization
- method of recording transactions, financial statement and balance sheet
- assets, liability, and long term capitals
- process of establishing forms
- labor unions
- termination of engineering contracts
- partnership
- business ownership
- arbitration
- breach of contract and liquidated damages



➤ **Labour Law: 1 credit (15 hours); L, T**

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


The Minister of Higher Education

Pr Jacques FAME NDONGO

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