UNIVERSITY OF BUEA

COLLEGE OF TECHNOLOGY

PROGRAMMES
AND
COURSES DESCRIPTIONS

The College of Technology (COT) of the University of Buea was created as a constituent component of the university by Decree No. 93/034 of 19 January 1993 and admitted the first batch of students in September 2010.

Vision

The COT aims to be a benchmark technological institution not only by offering nationally and regionally recognized full-time and part-time educational programmes across a spectrum of engineering disciplines using traditional and leading edge teaching technologies and methods but also by pioneering innovative programmes, whose graduates will respond to the critical national and sub-regional development needs and compete successfully in the global job market.

Motto: Train Locally Qualify Globally

Missions

In fulfillment of its vision, COT will produce highly competent senior level technicians in critical engineering fields imbued with the skills to be immediately productive on the job or capable of sustainable self-employment.

To achieve its mission, the COT will undertake to fulfill the following objectives:

i. Provide basic and specialized education in a learner-centred environment, which will enable life-long learning;
ii. Emphasize hands-on training so that graduates are immediately effective in the job;
iii. Create enduring relations with industry for internships and continuous dialogue on academic programmes and with professionals for supervision of students during internships;
iv. Create opportunities for professionals to present problems and the solutions they provided, emphasizing the engineering/scientific content, teamwork, and leadership skills;
v. Provide extended continuing education and skills conversion to working professionals and to graduates of general disciplines;
vi. Encourage research not only for the creation of new knowledge but also for application to the solution of practical problems of industry;
vii. Provide training in professional domains to graduates of faculties in order to improve on their (self) employment potentials;

I.3 Outcomes

Upon graduation form the COT, students will

- Possess indepth theoretical knowledge and practical skills of a chosen technical domain;
- Be able to transform acquired skills and knowledge to problem-solving capability on the job;
- Be flexible to function effectively in different types of work environments;

- Function effectively as a member of a work team;
- Possess effective oral and written communication skills;
- Have acquired fluency in information and communications technologies for
  use in personal, professional, and societal development;
- Be imbued with a healthy respect for the environment; and
- Understand the consequences of engineering and technology on society.

Administration

Director: Ningo Ndeh Ntomambang, Ph.D.
Deputy-Director: Sone Michael Ekonde, Ph.D.

Secretary-General: Ebah Lydia Ebude

Head of Service of Student Records: Apinjoh Tobias, Ph.D.
Head of Department of Computer Engineering: Mih Thomas, Ph.D.
Head of Department of Electrical and Electronic Engineering: Ningo Ndeh Ntomambang, Ph.D.

UNDERGRADUATE STUDIES

Department of Computer Engineering

OPTION : COMPUTER NETWORKS AND SYSTEMS MAINTENANCE

QUALIFICATION OFFERED: BACHELOR OF TECHNOLOGY
B.Tech. Computer Engineering with option in Computer Networks and systems maintenance

DURATION OF STUDIES: 3 Years

OBJECTIVES OF DEGREE PROGRAMME

The Department seeks to provide quality instruction at undergraduate level. It also encourages hands-on, which would enable its graduates to be able to harness forces and exploit resources so that they can be instruments for development. In this respect, the undergraduate courses lay emphasis on the teaching of basic Engineering principles and on the applications of various Engineering concepts, enhanced by practical sessions. The department also offers a professional Higher National Diploma (HND) programme in two years. The specific objectives for the Computer Networks and system maintenance are:

- To produce graduates who are well-educated in the fundamental concepts of Computer Networks and systems maintenance;
- To produce graduates who are capable of continuing their professional development throughout their career by combining theory with its application in Computer Engineering practice;
- To build human resource capacity in the Computer Network and system maintenance discipline in both the public and private sectors to students who wish to become proficient in developing Computer networks in a variety of platforms using a methodical approach;

SKILLS TO BE ACQUIRED:

At the end of the programme, the following skills should be acquired:

- Ability to understand sophisticated techniques in PC repair, including external I/O devices, printers, mobile computing devices, purchasing and building PCs, troubleshooting, support, virus protection, data protection, and recovery.repair and main.
- Ability to understand how computers communicate with each other, how computers are grouped together to form networks, networking concepts and issues that are key to the successful implementation of computer networks, and the different networking implementation strategies and technologies currently available.

EMPLOYMENT OPPORTUNITIES

The students will have opportunities in the following areas.

- As a technical staff in industries related to Computer networking and systems maintenance.
- As a Chief Executive Officer (CEO) in a small and medium sized company
- As a teacher in secondary school for Computer Networks and System Maintenance both in O level and A level

ADMISSIONS REQUIREMENTS

In addition to the general university requirements candidates must obtain a minimum of grade D at the Advanced level in Physics and Mathematics. Candidates with Baccalaureate Technical in Electrical Technology are also admitted.

GRADUATION REQUIREMENTS

B.Tech. in Computer Engineering

Requirements for Major

The following compulsory courses must be successfully completed in order to obtain a B.Tech. Degree in Computer Engineering with option in Computer networks and systems maintenance:

Head of Department: Mih Thomas, Ph.D.
Megoze Mathieu Hilaire, M.Sc., Assistant Lecturer

Part time lecturers

Tuma Wilson, M.Sc.
Ngatta George

Compulsory Courses

CVE 100: CIVICS AND MORAL EDUCATION
ENG 101: USE OF ENGLISH 1
ENG 102: USE OF ENGLISH 2
FRE 101: FUNCTIONAL FRENCH 1
FRE 102: FUNCTIONAL FRENCH 2
CEC 201: COMPUTER SYSTEMS
CEC 205: COMPUTER ARCHITECTURE 1
CEC 207: COMPUTER FOR BUSINESS
CEC 208: INSTALLATION AND MAINTENANCE
CEC 210: ELECTRO-PHYSICS
CEC 212: COMPUTER ARCHITECTURE 2
EEC 202: INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
EEC 204: MATHEMATICS 2
EEC 205: ANALOGUE ELECTRONICS 1
EEC 206: PHYSICS 2
EEC 208: PROGRAMMING 1
EEC 209: MATHEMATICS 1
EEC 211: PHYSICS 1
EEC 213: MATERIAL SCIENCE

EEC 215: DIGITAL ELECTRONICS 1
EEC 222: OPERATING SYSTEMS
CEC 306: SYSTEM ANALYSIS AND DESIGN
CEC 308: SYSTEM MAINTENANCE AND REPAIRS
CEC 310: COMPUTER NETWORK PRACTICALS
CEC 311: COMPUTER NETWORKS AND PROTOCOLS
CEC 313: FUNDAMENTALS OF NETWORK MANAGEMENT
COT 302: INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
COT 304: LEGAL ASPECTS RELATING TO BUSINESS
COT 305: MATHEMATICS 3
COT 306: INDUSTRIAL EXPERIENCE
COT 307: PRINCIPLES OF MANAGEMENT
EEC 301: DIGITAL ELECTRONICS 2
EEC 302: DIGITAL ELECTRONICS LABORATORY
EEC 303: ANALOGUE ELECTRONICS LABORATORY
EEC 305: ACCESS NETWORKS
CEC 401: COMPUTER NETWORK SECURITY
CEC 402: INTRODUCTION TO EMBEDDED SYSTEMS
CEC 403: SOFTWARE MAINTENANCE
CEC 404: DIGITAL SIGNAL PROCESSING
CEC 405: MICROPROCESSOR AND MICROCONTROLLER PRACTICALS
CEC 406: SYSTEM CONFIGURATION AND PROGRAMMING (WINDOWS & LINUX)
CEC 407: NETWORK ADMINISTRATION AND MONITORING PRACTICALS
CEC 408: WIRELESS NETWORKS
CEC 409: INTERNET APPLICATION PROGRAMMING
CEC 410: DESIGN WEB SITE PRACTICALS
CEC 419: DESIGN PROJECT
CEC 498: BTECH PROJECT
COT 401: ENTREPRENEURSHIP

SPECIAL GRADUATION REQUIREMENTS

In order to be awarded the degree of B.Tech. in Computer Engineering a total of 180 credits is required.

STRUCTURE OF PROGRAMME FOR B.Tech. IN COMPUTER ENGINEERING WITH OPTION IN COMPUTER NETWORKS AND SYSTEMS MAINTENANCE

YEAR: ONE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRST SEMESTER						
FRE 101	Functional French 1	2	UC	20	10	0	
ENG 101	Use of English 1	2	UC	20	10	0	
EEC 209	Mathematics 1	3	C	40	20	0	
EEC 211	Physics 1	3	C	40	20	0	
EEC 213	Material Science	3	C	40	20	0	
EEC 205	Analogue Electronics 1	3	C	40	10	10	
EEC 215	Digital Electronics 1	3	C	40	10	10	
CEC 201	Computer Systems	4	C	40	20	0	
CEC 205	Computer Architecture 1	4	C	40	10	10	
CEC 207	Computer For Business	3	C	40	20	0	
TOTAL		30		360	150	30	
	SECOND SEMESTER						
CVE 100	CIVICS AND ETHICS	4	UC	20	10	0	
EEC 202	INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS	2	C	20	10	0	
EEC 204	MATHEMATICS 2	3	C	40	20	0	
EEC 206	PHYSICS 2	3	C	40	20	0	
EEC 208	PROGRAMMING 1	4	C	30	10	20	
EEC 222	OPERATING SYSTEMS	4	C	30	10	20	
CEC 208	INSTALLATION AND MAINTENANCE	4	C	10	10	40	
CEC 210	ELECTRO-PHYSICS	3	C	40	10	10	
CEC 212	COMPUTER ARCHITECTURE 2	4	C	30	10	20	
TOTAL		31		260	110	110	

YEAR. TWO

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRST SEMESTER						
FRE 102	FUNCTIONAL FRENCH 2	2	UC	20	10	0	FRE 101
ENG 102	USE OF ENGLISH 2	2	UC	20	10	0	ENG 101
SPT 100	SPORTS	2	UC	0	0	30	
COT 305	MATHEMATICS 3	3	C	40	20	0	EEC 209
COT 307	PRINCIPLES OF MANAGEMENT	2	C	20	10	0	
CEC 311	COMPUTER NETWORKS AND PROTOCOLS	4	C	40	10	10	
CEC 313	FUNDAMENTALS OF NETWORK MANAGEMENT	4	C	40	10	10	
EEC 301	DIGITAL ELECTRONICS 2	4	C	40	10	10	EEC 215
EEC 303	ANALOGUE ELECTRONICS LABORATORY	4	C	0	0	60	EEC 205
EEC 305	ACCESS NETWORKS	3	C	40	10	10	
TOTAL		30		260	90	130	
	SECOND SEMESTER						
COT 302	INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS	2	C	20	10	0	
COT 304	LEGAL ASPECTS RELATING TO BUSINESS	2	C	20	10	0	
COT 306	INDUSTRIAL EXPERIENCE	10	C	20	0	40	
CEC 306	SYSTEM ANALYSIS AND DESIGN	4	C	40	10	10	
CEC 308	SYSTEM MAINTENANCE AND REPAIRS	4	C	10	0	50	
CEC 310	COMPUTER NETWORK PRACTICALS	3	C	0	0	60	CEC 205
EEC 302	DIGITAL ELECTRONICS LABORATORY	4	C	0	0	60	EEC 301
TOTAL		29		110	30	220	29

YEAR: THREE

Course Code	Course Title	Credit Value	Status	L	T	P	Prere-quisite
	FIRST SEMESTER						
COT 401	Entrepreneurship	4	C	40	20	0	
CEC 401	Computer Network Security	4	C	40	10	10	
CEC 403	Software Maintenance	4	C	10	10	40	
CEC 405	Microprocessor and Microcontroller Practicals	4	C	0	0	60	CEC 212
CEC 407	Network Administration and Monitoring Practicals	4	C	20	0	40	
CEC 409	Internet Application Programming	4	C	30	10	20	
CEC 419	Design Project	6	C	0	0	60	
TOTAL		30		140	50	230	
	SECOND SEMESTER						
CEC 402	Introduction to Embedded Systems	4	C	30	10	20	
CEC 404	Digital Signal Processing	4	C	40	20	0	EEC 204
CEC 406	System Configuration and Programming (Windows and Linux)	4	C	20	0	40	
CEC 408	Wireless Network	4	C	40	0	20	
CEC 410	Design Web Site Practicals	4	C	0	0	60	
CEC 498	BTech Project	10	C	0	0	60	
TOTAL		30		130	30	200	

SUMMARY

PARAMETER	NUMBER			
	CREDITS	LECTURE TEACHING HOURS	TUTORIAL TEACHING HOURS	PRACTICAL TRAINING HOURS
Year One	61	620	260	140
Year Two	59	370	120	350
Year Three	60	270	80	430
Sub-Total	180	1260	460	920
TOTAL CREDITS	180			
TOTAL CONTACT HOURS	2640			

COURSE DESCRIPTIONS FOR BTECH IN COMPUTER NETWORKS AND SYSTEM MAINTENANCE

CVE 100: CIVICS AND ETHICS 4 credits (20-10-0)

Objectives:
By the end of the course, the student should be able to:

- Identify and respects the rights of other citizens;
- Have a clear knowledge of individual and group rights;

- Develop national consciousness;
- Develop environment consciousness;
- Develop a positive attitude to public property;
- Have a keener conscience of general interest.

Content:

- Definition of: ethics, civics, deontology, human rights;
- Foundations of ethics;
- General and professional;
- Ethics;
- Deontology in education;
- Moral consciousness;
- The Universal declaration of Human Right;
- Protection of environment;
- Professional vocation;
- Good governance in public services;
- Human qualities
- Moral figures through national history and foreign history.

Outcomes:
At the end of the course student should be able to develop national consciousness and have a clear knowledge of individual and group rights

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ENG 101: USE OF ENGLISH 1 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;
Phrase;
Sentence;
Discourse;

- Basic grammatical functions;

Subject;
Objects;

- Grammatical categories;

Gender;
Person;
Number;
Count and non punctuation;
Etc

- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes
At the end of the course, students should be able to interact in all social situations where English is used

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ENG 102: USE OF ENGLISH 2 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;
Phrase;
Sentence;
Discourse;

- Basic grammatical functions;

Subject;

Objects;
- Grammatical categories;

Gender;
Person;
Number;
Count and non punctuation;
Etc
- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes
At the end of the course, students should be able to interact in all social situations more especially in Engineering and Technology where English is used

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FRE 101: FUNCTIONAL FRENCH 1 2 credits (20-10-0)

Objectives:
A la fin de la formation, l'aprenant doit avoir une bonne connaissance de la langue française pour mieux répondre à l'option politique du bilinguisme national et mieux s'intégrer au contexte socio-professionnel.

Content:
A la fois thématiques et morphosyntaxiques, l'accent sera mis sur :
- La grammaire ;
- Les variétés de français ;
- La communication ;
- La vie de l'entreprise ;
- L'étude et la production de textes.

Supports nécessaires à l'atteinte des objectifs :
- La lettre ;
- Le rapport ;
- Les textes littéraires ;
- Les coupures de journaux ;
- Les documents audio-visuels ;
- Compte rendu écrit ou oral des visites d'ateliers ;
- Textes descriptifs et narratifs ;
- Documents iconiques ;

- Le roman-photo ;
- Les exposés ;
- Les débats, etc…

N.B. : Les textes choisis devront tenir compte des spécialités.

Contenus thématiques	Savoir-faire linguistiques	Objectifs grammaticaux	Types de texte à produire	Supports didactiques
Communication	- Défendre un point de vue - Convaincre - persuader -Exprimer son opinion - Exprimer ses goûts - Donner des informations - Prendre des notes - Utiliser les sources d'informations orales et écrites - Situer dans le temps et dans l'espace. - Etablir une relation de cause et de conséquence. - Emettre des hypothèses.	- Les articulateurs logiques - La concession La négation polémique - Les données chiffrées - Les pronoms personnels - Les temps des verbes - Les indicateurs de chronologie (au début, d'abord, ensuite, puis, enfin, finalement etc…) - Les temps du récit passé composé, présent plus-que-parfait, le futur antérieur, l'imparfait -Antériorité, simultanéité, postérité - La nominalisation - Verbes exprimant une relation de cause/conséquence - L'hypothèse (si + Présent, si+imparfait, si+plus-que-parfait)	- Messages publicitaires - Discours de campagne Interview de personnes célèbres -Résumé de films -La lettre personnelle - La lettre officielle - La demande d'emploi - Le compte-rendu - Le rapport -Biographie - Le fait divers - Le texte informatif - Textes explicatifs - Lettres d'excuse - Rapports policiers	- Débats - Sources audio-visuelles - Les professions de foi - Les textes publicitaires, les manifestations et les tracts - Les tableaux et les chiffres - Tous les types de lettre - La carte de vœux - Curriculum vitae biographie des personnes célèbres, récits autobiographiques, coupures de presse - Faits divers - Textes scientifiques - Enquêtes policières
Discours rapport	- Rapporter les paroles de quelqu'un - Interpréter les paroles de quelqu'un -Identifier les sources d'informations	- Le discours rapporté, - Les verbes introducteurs de discours rapporté - La concordance des temps	- L'interview, le récit - Le dialogue associé au récit - les témoignages - les dépositions	- La conversation téléphonique -Les écrits journalistiques - La bande dessinée - Les documents sonores - Les extraits de film - Le roman photo
La prise de parole	- Prendre la parole - Participer à un débat	- Relier les informations au	- Exposé oral - Débat	- Sources sonores audio-visuelles - La mimogestualité

	- Présenter un exposé oral - Organiser un discours - Intervenir en public	moyen des pronoms relatifs - La précision du vocabulaire - La cohérence - Les registres de langues		- débats radiophoniques
La vie associative	- Donner un conseil - Interdire -Passer une consigne	- L'impératif - Le conditionnel - Le futur simple - Le subjonctif	- Les notices - Les modes d'emploi - Les rapports - Les exposés	- Les règlements intérieurs des jeux - Les notices - Les modes d'emploi - Les consignes
La vie socio-professionnelle	- Les formes d'emploi (vocabulaire du monde du travail) - Rédiger un CV - Faire un exposé pour présenter son expérience	- Utilisation des connecteurs - Formuler une définition.	- Les C.V - Demandes d'emploi - Les rapports - Les exposés	-Demande d'emploi - Les C.V - Les profils de postes
La description	- Interroger pour obtenir des informations et des explications - Rédiger un compte-rendu de visite - Décrire des installation - Décrire les mouvements	- Les formes, les couleurs, la mise en relief, les adjectifs pur caractériser	- Textes techniques - Modes d'emploi - Guide de l'utilisateur	- Textes techniques - Modes d'emploi - Guide de l'utilisateur.

Outcomes
At the end of the course, students should be able to interact in all social situations where French is used

FRE 102: FUNCTIONAL FRENCH 2 2 credits (20-10-0)

Objectives:
A la fin de la formation, l'aprenant doit avoir une bonne connaissance de la langue française pour mieux répondre à l'option politique du bilinguisme national et mieux s'intégrer au contexte socio-professionnel.

Content:
A la fois thématiques et morphosyntaxiques, l'accent sera mis sur :

- La grammaire ;
- Les variétés de français ;

- La communication ;
- La vie de l'entreprise ;
- L'étude et la production de textes.

Supports nécessaires à l'atteinte des objectifs :

- La lettre ;
- Le rapport ;
- Les textes littéraires ;
- Les coupures de journaux ;
- Les documents audio-visuels ;
- Compte rendu écrit ou oral des visites d'ateliers ;
- Textes descriptifs et narratifs ;
- Documents iconiques ;
- Le roman-photo ;
- Les exposés ;
- Les débats, etc…

N.B. : Les textes choisis devront tenir compte des spécialités.

Contenus thématiques	Savoir-faire linguistiques	Objectifs grammaticaux	Types de texte à produire	Supports didactiques
Communication	- Défendre un point de vue - Convaincre - persuader -Exprimer son opinion - Exprimer ses goûts - Donner des informations - Prendre des notes - Utiliser les sources d'informations orales et écrites - Situer dans le temps et dans l'espace. - Etablir une relation de cause et de conséquence. - Emettre des hypothèses.	- Les articulateurs logiques - La concession La négation polémique - Les données chiffrées - Les pronoms personnels - Les temps des verbes - Les indicateurs de chronologie (au début, d'abord, ensuite, puis, enfin, finalement etc…) - Les temps du récit passé composé, présent plus-que-parfait, le futur antérieur, l'imparfait -Antériorité, simultanéité, postérité - La nominalisation - Verbes exprimant une relation de cause/conséquence - L'hypothèse (si +	- Messages publicitaires - Discours de campagne Interview de personnes célèbres -Résumé de films -La lettre personnelle - La lettre officielle - La demande d'emploi - Le compte-rendu - Le rapport -Biographie - Le fait divers - Le texte informatif - Textes explicatifs - Lettres d'excuse - Rapports policiers	- Débats - Sources audio-visuelles - Les professions de foi - Les textes publicitaires, les manifestations et les tracts - Les tableaux et les chiffres - Tous les types de lettre - La carte de vœux - Curriculum vitae biographie des personnes célèbres, récits autobiographiques, coupures de presse - Faits divers - Textes scientifiques - Enquêtes policières

		Présent, si+imparfait, si+plus-que-parfait)		
Discours rapport	- Rapporter les paroles de quelqu'un - Interpréter les paroles de quelqu'un -Identifier les sources d'informations	- Le discours rapporté, - Les verbes introducteurs de discours rapporté - La concordance des temps	- L'interview, le récit - Le dialogue associé au récit - les témoignages - les dépositions	- La conversation téléphonique -Les écrits journalistiques - La bande dessinée - Les documents sonores - Les extraits de film - Le roman photo
La prise de parole	- Prendre la parole - Participer à un débat - Présenter un exposé oral - Organiser un discours - Intervenir en public	- Relier les informations au moyen des pronoms relatifs - La précision du vocabulaire - La cohérence - Les registres de langues	- Exposé oral - Débat	- Sources sonores audio-visuelles - La mimogestualité - débats radiophoniques
La vie associative	- Donner un conseil - Interdire -Passer une consigne	- L'impératif - Le conditionnel - Le futur simple - Le subjonctif	- Les notices - Les modes d'emploi - Les rapports - Les exposés	- Les règlements intérieurs des jeux - Les notices - Les modes d'emploi - Les consignes
La vie socio-professionnelle	- Les formes d'emploi (vocabulaire du monde du travail) - Rédiger un CV - Faire un exposé pour présenter son expérience	- Utilisation des connecteurs - Formuler une définition.	- Les C.V - Demandes d'emploi - Les rapports - Les exposés	-Demande d'emploi - Les C.V - Les profils de postes
La description	- Interroger pour obtenir des informations et des explications - Rédiger un compte-rendu de visite - Décrire des installation - Décrire les mouvements	- Les formes, les couleurs, la mise en relief, les adjectifs pur caractériser	- Textes techniques - Modes d'emploi - Guide de l'utilisateur	- Textes techniques - Modes d'emploi - Guide de l'utilisateur.

Outcomes

At the end of the course, students should be able to interact in all social situations more especially in Engineering and Technology where French is used

CEC 201: COMPUTER SYSTEMS 4 credits (40-20-0)

Objectives

By the end of this course, students should understand:

- Processors and how they work
- Backing store
- Peripheral devices
- Computer selection for specific applications i.e. computers to meet specification of requirement, performance evaluation of selected system, etc.

Content

- Processors and how they work
- Backing store
- Peripheral development
- Selection of computers for specific applications

Outcomes:
At the end of the course, students should be capable of choosing the right computer for a specific application

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CEC 205: COMPUTER ARCHITECTURE I 4 credits (40-10-10)

Objectives:
By the end of this course, students should understand:

- Distinguish between the operating systems
- Distinguish between the various computer systems
- Explain how the computer architecture is organised
- Explain the internal structure and operations of specific microprocessors and their generations.

Content:

- Distinguish operating systems on present day computers
- Computer interfacing and data transmission
- Microprocessors-structure and operations
- Commercially available microprocessors units

Outcomes:
At the end of the course, students should be capable of distinguishing between operating systems and understand the basic operations of a microprocessor

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EEC 206: PHYSICS II 3 credits (40-20-0)

Objectives:
Develop the capacity to apply physics principles to electrical engineering problems.

Content:

Electromagnetism :

- Magnetism , Magnetic Field and flux, Magnetic circuits
- Ampere Theorem
- Biot and Savart Law
- Energy and magnetic forces

Waves :

- Free Oscillations
- Progressive waves
- Electromagnetic Waves

Thermal phenomena:

- Heat transmission
- Thermal dissipation of materials

Outcomes:
At the end of the course, students should be capable of applying physics principles in engineering fields

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CEC 207: COMPUTER FOR BUSINESS 3 credits (40-20-0)

Objectives:
At the end of the course, the student should be able to:

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

Content:

- Introduction: historical background;
- Types of computers and application areas;
- Impact of computers on society;
- Current notion: e.g. information society and globalisation;
- Outline computer organisation (block structure of computers);
- Explanatory definitions and examples of basic hardware, software and networking;
- Explanatory definitions and procedures in using Computer systems (e.g. business and data processing);
- Internet working: Internet access; of Internet facilities (e.g. E-mail, WEB page access/download, file transfer). Information Services: e. commerce; mention assorted internet related protocols and standards: e.g. http, ftp, html;
- Office automation: Introductory use of word processor, graphics and spread sheet packages, database assess;
- Conceptual (abstract) view/layout of problem handled be given packages, optional, packages: presentation graphics and graphing packages;

Outcomes:
At the end of the course, students should be able to know computer related concepts

---

CEC 208: INSTALLATION AND MAINTENANCE I 4 credits (10-10-40)

Objectives:
By the end of this course, students should be able to install, configure, locate faults and repair computers.

Content:
- Microcomputer systems
- System installation
- Printers
- Visual display units
- Test equipment
- Fault finding

Outcomes:
At the end of the course, students should be able to install, configure, locate faults and repair computers.

CEC 210: ELECTROPHYSICS 3 credits (40-10-10)

Objectives:
The purpose or this course is to enable the student to understand the basic fundamentals in analogue and digital electronics. By the end of the course the student should be able to design basic structures of analogue and digital equipment.

Content:
Analogue:
- Semi conductor
- Semi conductor devices
- Field effect transistor
- Injunction transistor
- Photo electric devices
- Feed back amplifier
- Oscillators
- Multi vibrators
- Differential amplifiers
- Operational amplifiers

Noise

Outcomes:
At the end of the course, students should be capable of understanding advanced concepts in analogue electronics

---

CEC 212: COMPUTER ARCHITECTURE II 4 credits (30-10-20)

Objectives:
By the end of the course, students should be able to:

- Explain how the computer architecture is organised
- Explain the internal structure and operations of specific microprocessors and their generations.

Content:
- Processors based programming
- Real time control applications
- Microprocessor interfacing techniques
- Configure the computer with interfaces and control units
- Microcomputer based A.D and D/A converters.

Outcomes:
At the end of the course, students should understand how computer architecture is organized

---

EEC 202: INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
2 credits (20-10-
0)

Objectives:
- Equip students with the knowledge of political developments in Cameroon and the working of the Cameroon Government;
- Holders of the H.N.D, like all graduates of institutions of Higher learning should know and understand the legal and political environment in which they live and work;
- Holders of the H.N.D should know their rights and responsibilities as Cameroonian citizens.

Content:
- Survey of Cameroon political history.
- Constitutional developments in Cameroon since Re-unification.
- The division of power between the executive, judiciary and legislative
- Cameroon political parties and party politics
- The Government and the civil society.
- Pressure groups in Cameroon.
- Problems of development and nation-building.
- Government budgeting
- Managing the debt crisis.
- The foreign policy of Cameroon.
- Cameroon and her neighbours.
- The politics of trade.

Outcomes:
At the end of the course, students should have knowledge of political developments in Cameroon and the working of the Cameroon Government.

EEC 204: MATHEMATICS II 3 credits (40-20-0)

Objectives:

- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

1. INTEGRATION
   - Primitives and definitive integrals
   - Integrals of simple functions
   - Techniques of integrations
   - Partial fractions in R and integration of rational forms
   - Integration of rational functions of Sinx, Cosx
   - Integration of rational functions of Shx, Chx
   - Integration of rational functions of x and ax-b
   - Integration of $\sqrt{}$ ax^2+bx+c

2. Functions of several variables, scalar and vector-valued functions
   - Scalar-valued functions (definition and examples)
   - Partial differentiation of scalar-valued functions
     - First order partial derivatives
     - Second order partial derivatives

     Examples: Wave equation; heat equation; Laplace equation.
   - Vector fields, definition and examples
   - The gradient of a scalar-valued functions
   - The Laplacian of a scalar-valued function
   - The Laplacian of a vector field

Remark: All discussions will be limited to R_3

3. Multiple Integrals
   - Line (curvilinear) Integrals
   - Definition of doble integrals and properties
   - Application in calculating the area of simple geometric figures
   - The Jacobian
   - Change of variables
   - Triple integrals
   - Definition
   - Application of triple integrals in calculating the volumes of simple geometric figures, centre of mass, centre of gravity
   - Change of variables.

4. LINEAR ALGEBRA

A. Vector spaces, definition and examples

- Subspaces
- Linear dependence and independence
- Basis of finite dimensional vector space

B. Linear transformations
- Endomorphisms, automorphisms, isomorphisms
- Kernel and Image of linear transformation

C. Matrices
- Systems of linear equations
- Matrix representation
- Matrices
- Eigenvalue and Eigenvector problems
- Reduction of matrices

1st case: n distinct eigenvalues

2nd case: Eigenvalues with order of multiplicity greater than one

Outcomes:
At the end of the course, students should be able to understand the concepts of algebra and matrices as related to computation

---

EEC 205: ANALOGUE ELECTRONICS 1 3 credits (40-10-10)

Objectives:
The purpose of this course is to enable the student to understand the basic fundamentals in analogue electronics

Content:

I. DIPT amplifiers C{CE,CB,CC};
- Transistor equivalent in AC
- Equivalent circuit of the amplifiers above
- Explain how they function
- Calculation of voltage gain, current gain, inputs and output impedances,
- Power gain
- Compare the different amplifiers above.

II. Fet Amplifiers (CS, CG, CD):
- Transistor equivalent in AC
- Equivalent circuit of the amplifiers above
- Explain how they function
- Calculation of voltage gain, current gain, power gain
- Compare the different amplifiers above.

III. Frequency response of amplifiers:
- Considering coupling + by pass capacitors
- Cut off frequencies
- Bandwidth

- Bipolar and FET in HF.

IV. Examples of low frequency amplifiers:
- Power amplifiers
- Different classes of power amplifiers (class A, AB, B, C) and their characteristics
- Different power, efficiency
- Give example of each class

V. Rectifiers
- Halfwave, fullwave, bridge (single phase and three phase)
- Filtering
- Voltage regulation

Outcomes
At the end of the course, students should be understand basic transistor and amplifier configurations

---

EEC 208: PROGRAMMING I 3 credits (30-10-20)

Objectives:
This course uses the programming approach to teach students the principles of software engineering and provides an opportunity for them to learn about object-oriented design.

Content:
- Software development analysis
- Requirement analysis
- Programme Design
- Implementation
- Testing
- Maintenance

Outcomes:
At the end of the course, student should understand the basic structure of an algorithm and basic principles of software engineering

---

EEC 209: MATHEMATICS I 3 credits (40-20-0)

Objectives:
- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

1. DISCRETE MATHEMATICS
   - Logic
   - sets, relations and correspondence

2. CALCULUS

A/ Functions of real variable
- Domains and codomains
- Limits and continuities
- Odd and even functions
- Limits at the extremities at the domain of definition
- Derivatives and their applications
- Table of variations and curve tracing
- Rolle's theorem and mean-value theorem of differential calculus.

B/ Trigonometric functions and inverses
- Hyperbolic functions and inverses

C/ Taylor series
- nth degree polynominal approximation of function in the neighbourhood of zero
- regular and complementary parts of a taylor series, taylor series in the neighbourhood of zero of the functions Sinx, Cosx, Tanx, ex, e-x, In(1+x), ArgSinx, ArgCosx, ArgTanx, Coslix, Sunlix, Arcosh, ArgSinx and Argtalix.
- Applications to the study of thee behaviour of functions.

3. SEQUENCES OF REAL NUMBERS
   - Definition of a sequence of real numbers
   - Convergence of sequences
   - Monotonic sequences
   - Caudry sequences
   - Geometric and arithmetic progression

4. DEFINITION OF A FUNCTION
   - Behaviour of a function of a real variable
   - Domain of definition
   - Limits and even functions
   - Domain of study
   - Limits at the extremities of the domain of definition
   - Derivatives and application
   - Table of variation
   - Curve tracing
   - Rolls theorem
   - Mean-value theorem in differential calculs.

5. TRIGONOMETRIE AND INVERSE TRIGONOMETRIC FUNCTION
   - Hyperbolic functions and their inverses

6. TAYLOR SERIES
   - 4th degree polynomial approximation of function in the neighbourhood of zero

- Regular and complementary terms of a taylor expansions
- Tailors expansion formula for elementary functions in the neighbourhood of zero: Sinx, Cosx, Tanx, expx, exp-x, In(1+x), Arc cosx, Arc sinx, Arctana, Cohx, Sinhx, Arg coshx, Argsinhx, Argtanhx.

Applications in studying the behaviour of functions.

7. GEOMETRY

Conic Sections: circle, ellipse, parabole, hyperbola

- Graphs, Parametric representation
- Tangents and Normals
- Applications.

Outcomes:
At the end of the course, students should be able to understand the concepts of calculus as related to computation

---

EEC 211: PHYSICS I 3 credits (40-20-0)

Objectives:

Develop the capacity to apply physics principles to electrical engineering problems.

Content:

Mechanics :

- Mechanics of a single particle
- Solid Mechanics
- Potential and kinetic energy
- Statics
- Dynamics

Electricity :

- Charges and charge density
- Electric current and current density
- Complex and vector representation (Fresnel diagram)
- Electrostatics : Electric field , electric dipoles, Gauss Theorem, Poisson equation, Energy , Electric potential

Outcomes:
At the end of the course, students should develop the capacity to apply physics principles to electrical engineering problems.

EEC 213: MATERIAL SCIENCE 3 credits (40-20-0)

Objectives:
The purpose of this course is to provide the student with the knowledge of electrical properties of materials and thus selection for engineering uses, with natural and electrical properties of materials.

Content:
HND:

- Atomic models
- Einstein's and atomic models
- Uncertainty and Pauli exclusion principles
- Energy bands
- Structures of solids
- Thermal and optical properties
- Electrical and magnetic properties of material

Outcomes:
At the end of the course, student should have a knowledge of electrical properties of materials and thus know the materials for engineering uses

---

EEC 215: DIGITAL ELECTRONICS I 3 credits (40-10-10)

Objectives:
By the end of this course, students should be able to:

- Understand the concept of data and information presentation in digital systems
- Understand the different codes used in digital systems
- Understand basic logic functions
- Understand the basic digital logic functions
- Understand the design of simple combinational logic circuits using the basic logic devices:
- Understand the basic principles of bitable devices

Content:
I. Generalities:

1. number systems:
   - Natural number systems
   - Whole numbers
   - Integers
   - Rational number system
2. number representations:
   - Decimal representations
   - Binary representations and algorithms
   - Hexagonal representation and algorithms
   - Octal representations
   - Binary arithmetic and algorithms
   - Round off errors
   - Conversion from one system to another.

II. Different codes:

- Binary
- Decimal
- Gray
- Ascii
- Conversion from one code to another

III. Logic gates:

- Fundamental logic gates (OR and NOR)
- Other gates;
- Combination of logic gates
- Diode and transistor as switch
- Different logic families (DRL, DIL, TTL, RTL);
- Main digital IC circuits (TTL and characteristics, CMOS and characteristics)

IV. Combinational logic circuits:

- Explain the principle of operation of combinational logic
- Write down a logical sum of product equation
- Fundamental of Boolean algebra
- Selection of method
- Venn diagram
- Karnaugh map
- Simplification using different methods
- Practical different examples
- Adder, substractor, multiplier, counter down
- Mutiplexers and dimultiplexet

V. Programmable logic devices:ROM, PLA, PAL, FPGA

Outcomes:
At the end of the course, students should know the basic principles in the design and implementation of combinational logic circuits

---

EEC 222: OPERATING SYSTEMS 4 credits (30-10-20)

Objectives:
By the end of this course, students should understand:

- Operating systems
- Different operating systems e.g. DOS, Windows and Unix
- Different operating systems for different platforms

Content:

- Operating systems concepts
- Working with different operating systems
- Selection of operating systems for different platforms

Outcomes:
At the end of the course, students should be able to understand different operating systems

---

CEC 306: SYSTEM ANALYSIS AND DESIGN 4 credits (40 – 10 – 10)

Objectives

This course encourage students to focus on the basics on system analysis and system design.

Content

1. Introduction to Systems
2. Software (System) Development Life Cycle Models
3. Preliminary Analysis
4. Fact Finding and Decision Making Techniques
5. Functional Modelling
6. Data Modeling Techniques
7. Relational Data Modeling and Object Oriented Data Modeling Techniques
8. Testing and Quality Assurance

Outcomes:

At the end of the course, students should understand basic principles in software system analysis and design

---

CEC 308: SYSTEM MAINTENANCE AND REPAIRS 4 credits (10 – 0 – 50)

Objectives: This course should introduce students to the principles of general maintenance of electrical/ electronic appliances with emphasis on computers and networks

Content:

1. Understanding the Personal Computer
   Terminology; Evolution of Software; Installing a New Computer; Hardware Components; Function of the CPU; Memory, Input, Output, and Storage Devices; Operating Systems; Internet and Online Services; Troubleshooting PC Problems and Errors
2. An Introduction to Upgrading and Repairing PCs
   PC Components, Features, and System Design; Microprocessor Types and Specifications; Microprocessors from 1971 to the Present; Processor Specifications, Features, Manufacturing, Socket and Slot Types; CPU Operating Voltages; Heat and Cooling Problems; Math Coprocessors (Floating-point Units); Processor Generations and Multicore Processors; Processor Upgrades and Troubleshooting Techniques; Motherboards, Chipsets, and Buses; System Bus Types, Functions, and Features; System Resources; Resolving Resource Conflicts; Motherboard Selection Criteria
3. BIOS and Memory
   BIOS Hardware/Software; Motherboard ROM BIOS; Upgrading the BIOS; Preboot Environment; BIOS/MBR Error Messages; SDRAM, RDRAM, and other types of Memory; Pinouts; Memory Banks and Memory Module Speed; Parity Checking and Error-correcting Code (ECC); Installing RAM Upgrades, DIMM, RIMM, and SIMM Modules; Troubleshooting Memory; Memory Defect Isolation Procedures; The System Logical Memory Layout
4. Hard Disk Drives
   The ATA/IDE Interface; Magnetic Storage Principles; Hard Disk Storage; Hard Disk Drive Operation; Removable and Optical Storage; Physical Drive Installation and Configuration; Hard Disk Installation Procedures; Formatting;

Replacing an Existing Drive; Hard Disk Drive Troubleshooting and Repair; Installing an Optical Drive; Internal Floppy Drive Installation

5. Video and Audio
   Video Hardware; Maintaining Your Monitor; Video Display Adapters and 3D Graphics Accelerators; Upgrading or Replacing Your Video Card; Adapter and Display Troubleshooting; Audio Hardware; Early PC Audio Adapters; PC Multimedia History; Audio Adapter Features, Concepts and Terms; Installing the Sound Card; Troubleshooting Sound Card Problems; Speakers and Microphones; I/O Interfaces from Serial and Parallel to IEEE 1394 and USB
6. Internet and Networking
   Input Devices; Internet Connectivity; Securing and Sharing Your Internet Connection; Internet Troubleshooting; Local Area Networking; Network Protocols; Installing Networking Software; Troubleshooting a Network; Power Supplies, Troubleshooting, and Repair; Building or Upgrading Systems; Overclocking and Cooling; PC Diagnostics, Testing, and Maintenance

Outcomes: At the end of the course, the student should be capable of doing general maintenance on electrical/ electronic appliances and installing/ repairing networks

---

CEC 310: COMPUTER NETWORKS PRACTICALS 3 credits (0 – 0 – 60)

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

- Differentiate between straight-through cable and crossover cable configurations
- Use terminal programs to configure switches and routers
- Illustrate the main components of network operating systems with Linux and Windows servers
- Manipulate ADS/ WINS/ DNS/ DHCP/ TCP/ IP configurations on Windows servers
- Recognize basic network security feature on Windows servers

Content:

- Introduction: What Hardware is supported; Disk portioning
- Introduction to Networking: starting and stopping Network; Managing services
- Structured cabling
- Introduction to switching
- Configuring switches and routers
- Configuring Network Protocols and services: ADS; WINS; DHCP; TCP/ IP
- Configuring User and Group Accounts
- Configuring Networks security
- Network monitoring and analyzing tools

Outcomes:
At the end of the course, students should know how to use terminal programs to configure networks

---

CEC 311: COMPUTER NETWORKS AND PROTOCOLS 4 credits (40 – 10 - 10)

Objectives

By the end of this course, students should understand advanced concepts in:
- Network topologies
- Network protocols

Content
- Structure of computer networks
- Network topologies
- Network Protocols and services: ADS; WINS; DHCP; TCP/ IP
- Network operating systems (Linux and Windows)

Outcomes
At the end of the course, students should understand advanced concepts in Network topologies and protocols

---

CEC 313: FUNDAMENTALS OF NETWORK MANAGEMENT
4 credits (40 – 10 -10)

Objectives

By the end of this course, students should understand:
- Network topologies
- Network architectures
- Network administration

Content
- Structure of computer networks
- Network topologies
- Network protocols
- Network administration

Outcomes:
At the end of the course, students should understand the basics in Network topologies, architectures and administration

---

COT 302: INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
2 credits (20 – 10 – 0)

OBJECTIVES:
- To equip the student with the basic legal principles and concepts essential for an understanding of the legal environment in which he functions.
- To create an awareness of basic human rights and how they can be enforced or protected within the professional context.

- To acquaint the student with the basic texts pertinent to environmental protection and sustainable development.

CONTENT:

PART ONE: Introduction to law:

- The definition of Law
- The classification of Law;
- Sources of Law;
- Laws and Enabling Acts (Texts of Application);
- The concept of legal personality;
- Civil Responsibility (i.e Contract, TORT);
- Criminal Responsibility:
- The Courts and their Jurisdictions;
- Labour Law: formation and execution of the labour contract, remuneration, conditions of work, obligations of the employer and employer and employee, Termination of the labour contract.

PART TWO: Fundamental Rights

- The concept of Human Rights: problem of Definition and context;
- Sources of Human Rights;
- Major international Conventions on Human Rights;
- International conventions relating to women, children and the rights of minorities;
- The Role of the Judiciary and the legislature in the protection of Human Rights;
- The Cameroonian National Commission on Human Rights and Liberties;
- The Civil Society, NGO's and the protection of Human Rights,
- Freedom of expression and the Rights to privacy;
- Violation of Human Rights and Remedies;
- Environmental Protection;
- Pollution, Waste disposal and hazardous activities.

Outcomes

At the end of the course, students should understand the basic legal principles and fundamental rights.

COT 304: LEGAL ASPECTS RELATING TO BUSINESS 2 credits (20 – 10 – 0)

OBJECTIVES:

The course should introduce the student to some fundamental with reference to the industrial and technological fields.

CONTENT:

1. Intellectual Property Law

- World Intellectual Property Organisation (WIPO); Treaties and their implementation;
- Patent law
- Design law;

- Trade and service marks law;
- Copyright law;
- Computer and technology law: fundamentals and computer, contracts, computer fraud and tracking;

2. Law of arbitration
   - Notions of arbitration;
   - Other alternative techniques of resolving conflicts: mediation, negotiation, conciliation and reconciliation…
   - Arbitration agreements;
   - Arbitration tribunals;
   - Proceedings;
   - Awards: recognising, enforcing and resisting awards;
   - Applicable laws;
   - Impact of the OHADA Treaty
3. Company Law
   - Formation of companies;
   - Types of companies;
   - Running and management of companies;
   - Insolvency, liquidation and winding up.
4. Taxation Law
   - Fundamental principles of taxation;
   - Fiscal and customs reforms within the CEMAC;
   - Methods of tax imposition on companies;
   - Types of tax regulations.

Outcomes
At the end of the course, students should understand the basic legal principles and concepts essential for an understanding of the legal environment

---

COT 305: MATHEMATICS III 3 credits (40-20-0)

Objectives:
- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

1. LINEAR DIFFERENTIAL EQUATIONS
   - Complex numbers, linearization
   - 1st order linear differential equations
     - Definition and examples (physics)
     - Solving the associated homogeneous equation
     - Solving the complete linear differential equation of first order.

2. LINEAR DIFFERENCE EQUATIONS OF FIRST AND SECOND ORDER AND METHODS OF SOLUTION

3. SOLVING SYSTEMS OF DIFFERENTIAL EQUATIONS OF THE FORM
   $\frac{Dx}{Dt} = AX + B, X = [y], A\varepsilon\square \quad 2\times 2$ (R)

   $B \varepsilon\square$ n x 1 ®

4. SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS
   - Definition and examples
   - Solving the associated homogeneous equation
   - Characteristic equations

5. FOURIER SERIES
   - Periodic functions
   - Definition of the Fourier Series of a 2T-periodic functions and formulas to calculate the coefficients au, an and bn
   - Definition of Fourier series of 2T-periodic functions (T>0) and formulas to calculate the Fourier coefficients.
   - Applications in signal processing.

6. OPERATIONAL CALCULUS
- Definition of the Laplace transform and examples
- Laplace transform of a translation, of the derivative of a function, Laplace transform of a constant and exponentials
- Inverse Laplace transforms.

Remark: Proofs and knowledge of proofs is not required

7. PROBABILITY AND STATISTICS.

A. PROBABILITY
- Definition of probability and properties;
- Conditional probabilities;
- Baye's theorem;
- Random variables;
- Moments;
- Expectation, variance, standard deviation;
- Chehychev's sky inequality

B. PROBABILITY DISTRIBUTIONS
- Discrete distributions;
- Bernouilli's distributions;
- Binomial distributions;

  - Continuous distributions;

- Uniform distributions;
- The Normal distributions;
- The Poisson distributions.

C. STATISTICS

- Descriptive statistics;
- Graphical representation;
- Central tendency, dispersion (mean, mode, median, variance and standard deviation, deciles and interquatile range);
- Covariance;
- Correlation coefficients and regression;
- Least square methods;
- Estimation of the mean and the standard deviation;
- Confidence intervals;
- Test of hypothesis.

Outcomes:
At the end of the course, students should be able to understand the concepts of statistics and probability as related to computation

---

COT 306: INDUSTRIAL EXPERIENCE 10 credits (20 – 0 – 40)

Objectives:

This is an essential aspect of the training aimed at giving industrial practical and motor skills to students.

Organisation:

The workshop or industrial experience shall be carried out either within a block period of not less than three months per academic year. Alternatively, where workshop exist in a school, it shall be preferable to have industrial practice of 8 to 10 hours a week.

COT 307: PRINCIPLES OF MANAGEMENT 2 credits (20-10-0)

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

- Plan, organise, co-ordinate or guide the activities and efforts of subordinates in achieving set goals in the most economical and efficient manner possible.
- Understand and apply management theory to the running of any middle size enterprise.
- Overcome the complexities in modern management.

CONTENT:

- Defining management in general terms;
- Development of modern management thought:
  - Behavioural school;
  - Management process school;
  - Quantitative school;
  - Integrated approach;
  - Systems approach;
  - Contingency approach;
- Planning, organizing, motivating, and controlling as applied to the management of a business;
- The functional field of production/operations management;
- Communication in modern management;
- Leadership, problem-solving techniques, coordination, and human relations necessary for successful management;
- Human resource planning;
- The job;
- The staffing process and compensation schemes;
- Decision making in management.

Outcomes:
At the end of the course, students should be able to plan, organise, co-ordinate or guide activities and efforts in achieving set goals

---

EEC 301: DIGITAL ELECTRONICS II 4 credits (40-10-10)

Objectives:
The course gives the student an opportunity to understand and master basic sequential logic tools.

Content:

1. FLIP FLOPS
   - R-S flip flop
   - J-K flip flop
   - Timing parameters
   - Applications
   - Finite State Machines(FSMs)
     - ❖ Moore machine
     - ❖ Mealy machine
2. Counters
   - Asynchronous
   - Synchronous
   - Up/Down counters
   - Decade and BCD counters
   - Decoding a counter
   - Cascading counters
   - Designing counters with arbitrary sequences

3. Registers
   - Serial-in shift registers
   - Parallel-in shift registers
   - Bidirectional shift registers
   - Universal shift registers
   - Shift register counters
4. Data conversion circuits
   - D/A converters
     - ❖ D/A converter specifications
     - ❖ Types of D/A converters
     - ❖ D/A converter applications
   - A/D converters
     - ❖ A/D converter specifications
     - ❖ Types of A/D converters
     - ❖ A/D converter applications
   - Application to 68000 Motorola microprocessor

Outcomes:
At the end of the course, students should know the basic principles in the design and implementation of combinational logic circuits

---

EEC 302: DIGITAL ELECTRONICS LABORATORY 4 credits (0 – 0 – 60)

Objectives: Students will be capable of designing, analyzing and observing an digital electronic circuits.

Contents:

- Arithmetic Circuit- construction and testing using 74xxICs
  - Half adder and Full adder.
  - Half subtractor and Full subtractor.
- Combinational logic circuit design using 74xxICs.
- Encoders and Decoders.
- Multiplexer and Demultiplexer.
- Study of Arithmetic Logic Unit(ALU) using IC 74181.
- Construction of 1- bit comparator using 74xxICs and study of 4-bit comparator IC 7485.
- code converters – Binary to gray and Gray to binary.
- Verification of basic flip flops using 74xxICs and master- slave JK flip-flop using IC 7476
- Asynchronous counter design and Mod-n counter.
- 3-Bit synchronous counter design
- Shift register- SIPO/SISO & PISO/PIPO.
- Study of RAM.

Outcomes: At the end of the course, the student should be capable of designing, implementing and troubleshooting basic digital electronics circuits

---

EEC 303: ANALOGUE ELECTRONICS LABORATORY 4 Credits (0-0-60)

Objectives: Ensure students are familiar with common laboratory instruments and techniques and can conduct experiments in analogue circuits relating theoretical concepts with real and non-ideal components.

Content: Orientation: Safety, measurements, and PSPICE, Laboratory Equipment: Oscilloscope, ohmmeter, potentiometer, and ammeter, Resistor Measurements: Kirchhoff's laws, series/parallel resistive circuits, BJT and FET: characteristics and gain, Op-Amps: bandwidth and gain.

Outcomes: The students are expected to understand the basic use of PSPICE and MATLAB programmes and measurements on circuits implemented on circuit board

---

EEC 305: ACCESS NETWORK 3 credits (40 – 10 – 10)

Objectives

- To teach the student on the technology available in providing accessibility to global telecommunication network
- At the end of this course, the student should understand the differences between networks and their capability.

CONTENT

1. Introduction

2. types of networks.
   - Analog network
   - Integrated digital network (IDN)
   - Integrated service digital network (ISDN)
   - Cellular radio
   - Intelligent network
   - Private network

3. Access Methods used in these network

4. Wireless Networking
   - Introduction to wireless networks
   - Differences between wireless networking
   - Development of wireless networks
   - Cordless telephone (DECT-2)

Outcomes

At the end of the course, students should know the basic principles in the accessibility to global telecommunication network

---

CEC 401: COMPUTER NETWORK SECURITY 4 credits (40 – 10 – 10)

Objectives: The student should be to able to understand the underlying security policy defining for computer networks

Content

1. Overview of Information Security
   Introduction; Need of Information Security; Basic types of Security;

2. Encryption Methods

Transposition Cipher; Substitution Cipher; Caesar Cipher; Playfair Cipher; Monoalphabetic; Hill Cipher; Vigenere Cipher; One-time pad

3. Confidentiality & key management

Cryptanalysis; Types of Cryptography; Symmetric Key Cryptography; Asymmetric Key Cryptography; DES; RSA; Diffie Hellman; Kerberos; Elliptic Curve Arithmetic

4. Information Hiding and data integrity

Steganography; Digital Signature; Audio and Video Watermarking; Birthday Attack; Hash Function; RC-5; MD-5; SHA

5. Authentication and identity management

Passwords; MAC; Digital Certificates; Session Keys; Smart Card; Biometrics; Trusted Servers

6. Software Vulnerabilities and Firewalls

- Types of Vulnerabilities:
  Virus; Worm; Trojan Horses Zombies; Trap Doors;

- Types of Attacks

Back-Door Attack; Brute Force Attack; Dictionary Attack; DoS Attack; Distributed DoS Attack; Man-in-the-Middle Attack

- Firewalls

Characteristics of Firewall; Types of Firewall

7. Web and Network Security

SSL/TLS; SSL Objectives and Layers; IP Security Architecture

Outcomes: At the end of the course, the student should be capable of developing cryptographic algorithms and know how the algorithms are implemented in computer networks

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CEC 402: INTRODUCTION TO EMBEDDED SYSTEMS 4 credits (30 – 10 – 20)

Objectives: Embedded software is used today everywhere in computers used in cellphones, pagers and cars to computer systems for medical diagnosis, climate control and power generation. It has to run in real-time, concurrently, sometimes distributed over a network. The objective of the course is to study the hardware requirements posed by embedded systems, their software architecture and operating

systems and to learn an object-oriented modelling methodology for embedded systems.

Contents:

1. Introduction to Embedded Systems
2. Hardware fundamentals for Software Engineers.
3. Sensors
4. Networks for Embedded Systems.
5. Survey of Software Architectures.
6. Modelling Real-Time Systems
7. Introduction to Rational Rose RealTime UML
8. Capsule Structure and Behavior.
9. Mapping Requirements to Design.
10. Model Hierarchies.
11. Real Time Operating Systems
12. Design Using a Real-Time Operating System.
13. Development Tools.
14. Debugging Techniques.

Outcomes: At the end of the course, student should be capable of implementing embedded systems

---

CEC 403: SOFTWARE MAINTENANCE 4 credits (10 – 10 – 40)

Objective: develop the skills for configuring, diagnose and repairs softwares application.

Content

- Troubleshooting of Bios errors
- Flashing the BIOS: why, when, how?
- Security of data, data storage: defining a methodology and policy, adopting a storage media.
- Virus and anti-virus

Outcomes: At the end of the course students should be capable of performing general software maintenance on PC

CEC 404: DIGITAL SIGNAL PROCESSING 4 credits (40-20-0)

Objectives:

By the end of this course, students should understand:

- the fundamental concepts which form the foundation of digital signal processing
- filtering techniques
- Modelling of signals
- Sampling of signals

Content:

I/ Fundamental concepts

- Sequences
- Signal manipulations
- Discrete-time system properties
- Convolution
- Difference equations
- Block diagram

II/ Z-Transform.

- Relation between unit-sample response and transfer function
- Forward Z-transform.
- Inverse Z-transform.
- Properties of Z-transform.
- Application to solving difference equations.

III/ Fourier analysis

- Fourier series
- Fourier transforms
- Discrete-time Fourier Transform (DTFT)

IV/ Discrete Fourier Transform (DFT)

- Primitive roots of unity
- Discrete Fourier series
- Discrete-time Fourier Transform
- Discrete Fourier transform and properties
- Fast Fourier Transform (FFT)

V/ Digital filtering of analog signals

- Sampling
- Data reconstruction
- Digital processing of analog signals

VI/ Filter structures

- Types of filters
- Digital filter realizations

Outcomes:
At the end of the course, students should understand basic principles in digital signal processing

---

CEC 405: MICROPROCESSOR AND MICROCONTROLLER PRACTICALS

4 credits (0 – 0 – 60)
Objectives: to teach the student how to program a RISC processor
Content: Work on a selected microcontroller
Outcome: At the end of the course, the student should be able to design and implement using a programmable logic controller (PLC)
Outcomes
At the end of course, students should be able to design and implement processes using microcontrollers

---

CEC 406: SYSTEM CONFIGURATION AND PROGRAMMING (WINDOWS AND LINUX) 4 credits (20 – 0 – 40)
Objective: Understanding the functioning of the main OS (Windows and Linux OS),
Content:

- Operating Systems kernel and Utilities.
- Shell Programming: Shell metacharacters, shell variable and scripts, facilities and command, environment variable.
- Batch processing.
- Installing the environment (Linux), application to Bourne Shell, korn shell and C shell.

Outcomes
At the end of the course, students should understanding the functioning of the main OS (Windows and Linux OS),

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CEC 407: NETWORK ADMINISTRATION AND MONITORING PRACTICALS
4 credits (20 – 0 –
40)

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

- Describe machine identity
- Use file sharing
- Administer Users
- Implement email
- Install firewalls and system monitoring
- Implement user security
- Troubleshoot network problems

Content:

- DNS: Zone configuration; domain configuration
- Network File sharing (NFS) services
- User administration: Create/ delete/ modify users; user policy; escalate privileges; access control lists (ACLs); pluggable authentication modules (PAM); Quotas
- Email services: Create/ delete/ modify users; Escalate privileges; Email protocols
- HTTP: overview of HTTP; Apach configuration; Virtual hosts; Implementing SSL

- Routers, Firewalls and Monitoring: Linux as a firewall; Multiple NICs, Multiple IP addresses; Routers, IP forwarding; iptables; Packet sniffing; Port scanning; TCP wrappers; Intrusion detection systems; General security principles; Monitoring utilities

Outcomes
At the end of the course, students should be capable of troubleshooting and monitoring networks

---

CEC 408: WIRELESS NETWORKS 4 credits (40 – 0 – 20)
Objective: The student is expected acquire skills for installing, configuring, diagnose and repairing such a network.

Content:
- Installing and configuring a wireless Network: Equipment and their interconnection
- Troubleshooting

Outcomes: At the end of the course students should be capable of troubleshoot and install wireless networks

---

CEC 409: INTERNET APLLICATION PROGRAMMING 4 credits (30 – 10 - 20)
Objective: familiarize with the language and tool necessary in developing an application based on Internet architecture and protocols.
Content
- Introduction to internet, web browser and others services protocols (FTP, HTTP, …)
- Creating HTML documents
- Programming Cascading Sheet Style (CSS) and DHTML
- Interactive programming using ASP .Net, JavaScript and Applets
- Server side programming (Servlet), script language and processor (PHP)

Outcomes:
At the end of the course, students should have an understanding of the language and tool necessary in developing an application based on Internet architecture and protocols.

CEC 410: DESIGN WEBSITE PRACTICALS 4 credits (0 – 0 – 60)
Objective: at the end of this course, the students must be able to
- Configure the running environment for Internet applications,
- Develop and install an application

Content:
- Choosing, installing and configure a web server: APACHE/IIS/…
- Installing and configure a language processor: PHP, …
- Case study: designing, writing and installing a web application.

Outcomes: At the end of the course, the student should be able to design and implement websites

---

CEC 419: DESIGN PROJECT 6 credits (0 – 0 – 60)

Objectives: Under the care of a teacher, a supervised project must permit a student to design and implement a set-up which is relevant to the society

Content:

The problematic of the subjects related to these projects are based on the following themes; however, the list is inexhaustible:

- The function of Analogue Electronics
- The function of digital electronics
- Instrumentation
- Software system design and analysis
- Internet technology
- Computer networks

----- etc

Outcome: At the end of the course, the student should be able to design and implement set-ups addressing the needs of the society

---

CEC 498: BTECH PROJECT 10 credits (0 – 0 – 60)

Objectives: Under the care of a teacher, a supervised project must permit a student to :

- Master how to carry out the scaling of setups which can either be of an elaborated form or are not prototypes or are parts of prototypes and destined to verity a function or a set of electronic function.
- Put in place, exploit and maintain electronic systems

Content:

The problematic of the subjects related to these projects are based on the following themes; however, the list is inexhaustible:

- The function of Analogue Electronics
- The function of digital electronics
- Instrumentation
- Software system design and analysis
- Internet technology
- Computer networks

----- etc

Outcome: At the end of the course, the student should be able to master the structure of a scientific write-up

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COT 401: ENTREPRENEURSHIP 4 credits (40 – 20 – 0)

Objectives:

Upon completion of this course, the student will be able to:

- Define entrepreneurship within the context of society, organizations and individuals.
- Demonstrate an understanding of the impact of entrepreneurship on the economy.
- Recognize entrepreneurial attitudes and behaviors within him/herself and others.
- Distinguish between an entrepreneurial and a conventional approach to management.
- Recognize and overcome obstacles to creative problem-solving.
- Describe the elements of an effective business model/plan.
- Develop a concept for an innovative product or service in his or her own area of interest.
- Recognize that entrepreneurial success in the 21 stcentury depends on teamwork and diversity.
- Develop a personal framework for managing the ethical dilemmas and social responsibilities facing entrepreneurs.
- Describe the leadership styles of entrepreneurs who have been successful in different sectors (e.g., start-ups, corporations, community, public sector, etc.).
- Identify traits/characteristics of an entrepreneur/intrapreneur as exhibited in behavior.
- Analyze elements of the entrepreneurial mind set and discuss the implications for functioning as a successful entrepreneur.

Content:

I. Entrepreneurship
- Definition and philosophy
- History
- Role within the economy

II. Entrepreneurship in different contexts
- Social (donating profits, "doing good", non-profit)
- Organizational (start-ups, corporate, public sector)
- Individual (career management)

III. Types of new ventures
- Franchises
- Family businesses
- Business-within-a-business (entrepreneurship)
- Start-ups

IV. Entrepreneurial style
- Nature vs. nurture (personality traits, teachable behaviors)
- Strengths and weaknesses
- Sustainable across time and organizational settings

V. Creative problem-solving

- Courage to create
- Overcoming obstacles
- Selling your idea to others

VI. The entrepreneurial management process
- Opportunity and the entrepreneur
  - Recognizing and testing opportunity
  - Developing and testing the business concept
  - Building a team (diversity, roles)

- Analyzing and testing opportunity
  - Analyzing industry risks and benefits
  - Analyzing customer risks and benefits
  - Analyzing product/service risks and benefits
  - Analyzing financial and legal risks
- Preparing for the future - planning for growth

VII. Business concepts/models
- From solution to innovative product/service
- From product/service to business concept (value proposition)
- From business concept to feasibility study

VIII. Ethics and social responsibility
- Dilemmas and choices (partners vs. solo, money and control, technology and innovation, etc.)
- Giving back to the community
- Case studies

IX. Entrepreneurs as role models
- Famous (and not so famous) entrepreneurs and what we can learn from them
- Differences in experience and leadership style

Outcomes:
At the end of the course, students should be able to model and plan a small business

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UNDERGRADUATE STUDIES

Department of Computer Engineering

OPTION : SOFTWARE ENGINEERING

QUALIFICATION OFFERED: BACHELOR OF TECHNOLOGY
B.Tech. Computer Engineering with option in Software Engineering

DURATION OF STUDIES: 3 Years

OBJECTIVES OF DEGREE PROGRAMME

The Department seeks to provide quality instruction at undergraduate level. It also encourages hands-on, which would enable its graduates to be able to harness forces and exploit resources so that they can be instruments for development. In this respect, the undergraduate courses lay emphasis on the teaching of basic Engineering principles and on the applications of various Engineering concepts, enhanced by practical sessions.

The department also offers a professional Higher National Diploma (HND) programme in two years.

The specific objectives for the Software Engineering are:

- To produce graduates who are well-educated in the fundamental concepts of Software Engineering;
- To produce graduates who are capable of continuing their professional development throughout their career by combining theory with its application in Computer Engineering practice;
- To build human resource capacity in the Software Engineering discipline in both the public and private sectors to students who wish to become proficient in Software development in a variety of platforms using a methodical approach;

SKILLS TO BE ACQUIRED:

At the end of the programme, the following skills should be acquired:

- Ability to understand sophisticated techniques in system analysis and design
- Ability to have a sound understanding of computer science;
- Ability to understand current programming languages, such as Visual Basic, Java and C/C++;
- Ability to understand the methodology of software systems engineering and Software development in modern environments.

EMPLOYMENT OPPORTUNITIES

The students will have opportunities in the following areas.

- As a technical staff in industries related to Software Engineering. These areas may include software developer, software programmer, application developer, Web application developer, software engineer, software applications analyst, Web applications analyst, Web applications specialist and software applications specialist.
- As a Chief Executive Officer (CEO) in a small and medium sized company

- As a teacher in secondary school for Software Engineering and ICT both in O level and A level

ADMISSIONS REQUIREMENTS

In addition to the general university requirements candidates must obtain a minimum of grade D at the Advanced level in Physics and Mathematics. Candidates with Baccalaureate Technical in Electrical Technology are also admitted.

GRADUATION REQUIREMENTS

B.Tech. in Computer Engineering

Requirements for Major

The following compulsory courses must be successfully completed in order to obtain a B.Tech. Degree in Computer Engineering with option in Software Engineering:

Compulsory Courses

CVE 100: CIVICS AND MORAL EDUCATION
ENG 101: USE OF ENGLISH 1
ENG 102: USE OF ENGLISH 2
FRE 101: FUNCTIONAL FRENCH 1
FRE 102: FUNCTIONAL FRENCH 2
CEC 201: COMPUTER SYSTEMS
CEC 202: NETWORK MANAGEMENT
CEC 205: COMPUTER ARCHITECTURE 1
CEC 206: SYSTEM ANALYSIS
CEC 207: COMPUTER FOR BUSINESS
CEC 212: COMPUTER ARCHITECTURE 2
EEC 202: INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
EEC 204: MATHEMATICS 2
EEC 206: PHYSICS 2
EEC 208: PROGRAMMING 1
EEC 209: MATHEMATICS 1
EEC 211: PHYSICS 1
EEC 213: MATERIAL SCIENCE
EEC 215: DIGITAL ELECTRONICS 1
EEC 222: OPERATING SYSTEMS
CEC 301: DATABASE MANAGEMENT SYSTEMS
CEC 302: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING
CEC 303: RELATIONAL DATABASE
CEC 304: DATA SECURITY AND INTEGRITY
CEC 305: DATA STRUCTURE AND ALGORITHM
CEC 307: FUNDAMENTALS OF SOFTWARE ENGINEERING
COT 302: INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
COT 304: LEGAL ASPECTS RELATING TO BUSINESS
COT 305: MATHEMATICS 3
COT 306: INDUSTRIAL EXPERIENCE
COT 307: PRINCIPLES OF MANAGEMENT
EEC 301: DIGITAL ELECTRONICS 2
EEC 302: DIGITAL ELECTRONICS LABORATORY
CEC 402: INTRODUCTION TO EMBEDDED SYSTEMS
CEC 404: DIGITAL SIGNAL PROCESSING
CEC 409: INTERNET APPLICATION PROGRAMMING
CEC 410: DESIGN WEB SITE PRACTICALS
CEC 411: MODELING IN INFORMATION SYSTEMS
CEC 412: INTRODUCTION TO VIRTUAL INSTRUMENTATION
CEC 413: SOFTWARE DEVELOPMENT
CEC 414: INTRODUCTION TO ARTIFICIAL INTELLIGENT SYSTEMS

CEC 415: DISTRIBUTED PROGRAMMING
CEC 417: MOBILE APPLICATION DEVELOPMENT
CEC 419: DESIGN PROJECT
CEC 498: BTECH PROJECT
COT 401: ENTREPRENEURSHIP

SPECIAL GRADUATION REQUIREMENTS

In order to be awarded the degree of B.Tech. in Computer Engineering a total of 180 credits is required.

STRUCTURE OF PROGRAMME FOR B.Tech. IN COMPUTER ENGINEERING WITH OPTION IN SOFTWARE ENGINEERING

YEAR: ONE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRST SEMESTER						
FRE 101	Functional French 1	2	UC	20	10	0	
ENG 101	Use of English 1	2	UC	20	10	0	
EEC 209	Mathematics 1	3	C	40	20	0	
EEC 211	Physics 1	3	C	40	20	0	
EEC 213	Material Science	3	C	40	20	0	
EEC 215	Digital Electronics 1	3	C	40	10	10	
CEC 201	Computer Systems	4	C	40	20	0	
CEC 205	Computer Architecture 1	4	C	40	10	10	
CEC 207	Computer For Business	3	C	40	20	0	
TOTAL		27		320	140	20	
	SECOND SEMESTER						
CVE 100	CIVICS AND ETHICS	4	UC	20	10	0	FRE 101
EEC 202	INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS	2	C	20	10	0	ENG 101
EEC 204	MATHEMATICS 2	3	C	40	20	0	
EEC 206	PHYSICS 2	3	C	40	20	0	
EEC 208	PROGRAMMING 1	4	C	30	10	20	
EEC 222	OPERATING SYSTEMS	4	C	30	10	20	
CEC 202	NETWORK MANAGEMENT	4	C	30	10	20	
CEC 206	SYSTEM ANALYSIS	4	C	30	10	20	
CEC 212	COMPUTER ARCHITECTURE 2	4	C	30	10	20	
TOTAL		32		270	110	100	

YEAR. TWO

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRST SEMESTER						
FRE 102	FUNCTIONAL FRENCH 2	2	UC	20	10	0	FRE 101
ENG 102	USE OF ENGLISH 2	2	UC	20	10	0	ENG 101
SPT 100	SPORTS	2	UC	0	0	30	
COT 305	MATHEMATICS 3	3	C	40	20	0	EEC 209
COT 307	PRINCIPLES OF MANAGEMENT	2	C	20	10	0	
CEC 301	DATABASE MANAGEMENT SYSTEMS	4	C	40	10	10	
CEC 303	RELATIONAL DATABASE	4	C	40	10	10	
CEC 305	DATA STRUCTURE AND ALGORITHM	4	C	40	10	10	
CEC 307	FUNDAMENTALS OF SOFTWARE ENGINEERING	4	C	30	10	20	
EEC 301	DIGITAL ELECTRONICS 2	4	C	40	10	10	EEC 215
TOTAL		31		290	100	90	
	SECOND SEMESTER						
COT 302	INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS	2	C	20	10	0	
COT 304	LEGAL ASPECTS RELATING TO BUSINESS	2	C	20	10	0	
COT 306	INDUSTRIAL EXPERIENCE	10	C	20	0	40	
CEC 302	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING	4	C	40	10	10	
CEC 304	DATA SECURITY AND INTEGRITY	4	C	40	10	10	
CEC 312	SYSTEM DESIGN	4	C	30	10	20	
EEC 302	DIGITAL ELECTRONICS LABORATORY	4	C	0	0	60	EEC 301
TOTAL		30		170	50	140	

YEAR: THREE

Course Code	Course Title	Credit Value	Status	L	T	P	Prere-quisite
	FIRST SEMESTER						
COT 401	Entrepreneurship	4	C	40	20	0	
CEC 409	Internet Application Programming	4	C	40	10	10	
CEC 411	Modeling In Information Systems	4	C	30	20	10	
CEC 413	Software Development	4	C	30	20	10	
CEC 415	Distributed Programming	4	C	30	20	10	
CEC 417	Mobile Application Development	4	C	30	20	10	
CEC 419	Design Project	6	C	0	0	60	
TOTAL		30		200	110	110	
	SECOND SEMESTER						
CEC 402	Introduction To Embedded Systems	4	C	30	10	20	
CEC 404	Digital Signal Processing	4	C	40	20	0	EEC 204
CEC 410	Design Web Site Practicals	4	C	0	0	60	
CEC 412	Introduction To Virtual Instrumentation	4	C	30	20	10	
CEC 414	Introduction To Artificial Intelligent Systems	4	C	40	20	0	
CEC 498	Btech Project	10	C	0	0	60	
TOTAL		30		140	70	150	

SUMMARY

PARAMETER	NUMBER			
	CREDITS	LECTURE TEACHING HOURS	TUTORIAL TEACHING HOURS	PRACTICAL TRAINING HOURS
Year One	59	590	250	120
Year Two	61	460	150	230
Year Three	60	340	180	260
Sub-Total	180	1390	580	610
TOTAL CREDITS	180			
TOTAL CONTACT HOURS	2580			

COURSE DESCRIPTIONS FOR BTECH IN COMPUTER NETWORKS AND SYSTEM MAINTENANCE

CVE 100: CIVICS AND ETHICS 4 credits (20-10-0)

Objectives:
By the end of the course, the student should be able to:

- Identify and respects the rights of other citizens;
- Have a clear knowledge of individual and group rights;
- Develop national consciousness;
- Develop environment consciousness;
- Develop a positive attitude to public property;
- Have a keener conscience of general interest.

Content:

- Definition of: ethics, civics, deontology, human rights;
- Foundations of ethics;
- General and professional;
- Ethics;
- Deontology in education;
- Moral consciousness;
- The Universal declaration of Human Right;
- Protection of environment;
- Professional vocation;
- Good governance in public services;
- Human qualities
- Moral figures through national history and foreign history.

Outcomes:
At the end of the course student should be able to develop national consciousness and have a clear knowledge of individual and group rights

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ENG 101: USE OF ENGLISH 1 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;
Phrase;
Sentence;
Discourse;

- Basic grammatical functions;

Subject;
Objects;

- Grammatical categories;

Gender;
Person;
Number;

Count and non punctuation;
Etc

- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes
At the end of the course, students should be able to interact in all social situations where English is used

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ENG 102: USE OF ENGLISH 2 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;
Phrase;
Sentence;
Discourse;

- Basic grammatical functions;

Subject;
Objects;

- Grammatical categories;

Gender;
Person;

Number;
Count and non punctuation;
Etc

- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes
At the end of the course, students should be able to interact in all social situations more especially in Engineering and Technology where English is used

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FRE 101: FUNCTIONAL FRENCH 1 2 credits (20-10-0)

Objectives:
A la fin de la formation, l'aprenant doit avoir une bonne connaissance de la langue française pour mieux répondre à l'option politique du bilinguisme national et mieux s'intégrer au contexte socio-professionnel.

Content:
A la fois thématiques et morphosyntaxiques, l'accent sera mis sur :

- La grammaire ;
- Les variétés de français ;
- La communication ;
- La vie de l'entreprise ;
- L'étude et la production de textes.

Supports nécessaires à l'atteinte des objectifs :

- La lettre ;
- Le rapport ;
- Les textes littéraires ;
- Les coupures de journaux ;
- Les documents audio-visuels ;
- Compte rendu écrit ou oral des visites d'ateliers ;
- Textes descriptifs et narratifs ;
- Documents iconiques ;
- Le roman-photo ;
- Les exposés ;
- Les débats, etc…

N.B. : Les textes choisis devront tenir compte des spécialités.

Contenus thématiques	Savoir-faire linguistiques	Objectifs grammaticaux	Types de texte à produire	Supports didactiques
Communication	- Défendre un point de vue - Convaincre - persuader -Exprimer son opinion - Exprimer ses goûts - Donner des informations - Prendre des notes - Utiliser les sources d'informations orales et écrites - Situer dans le temps et dans l'espace. - Etablir une relation de cause et de conséquence. - Emettre des hypothèses.	- Les articulateurs logiques - La concession La négation polémique - Les données chiffrées - Les pronoms personnels - Les temps des verbes - Les indicateurs de chronologie (au début, d'abord, ensuite, puis, enfin, finalement etc…) - Les temps du récit passé composé, présent plus-que-parfait, le futur antérieur, l'imparfait -Antériorité, simultanéité, postérité - La nominalisation - Verbes exprimant une relation de cause/conséquence - L'hypothèse (si + Présent, si+imparfait, si+plus-que-parfait)	- Messages publicitaires - Discours de campagne Interview de personnes célèbres -Résumé de films -La lettre personnelle - La lettre officielle - La demande d'emploi - Le compte-rendu - Le rapport -Biographie - Le fait divers - Le texte informatif - Textes explicatifs - Lettres d'excuse - Rapports policiers	- Débats - Sources audio-visuelles - Les professions de foi - Les textes publicitaires, les manifestations et les tracts - Les tableaux et les chiffres - Tous les types de lettre - La carte de vœux - Curriculum vitae biographie des personnes célèbres, récits autobiographiques, coupures de presse - Faits divers - Textes scientifiques - Enquêtes policières
Discours rapport	- Rapporter les paroles de quelqu'un - Interpréter les paroles de quelqu'un -Identifier les sources d'informations	- Le discours rapporté, - Les verbes introducteurs de discours rapporté - La concordance des temps	- L'interview, le récit - Le dialogue associé au récit - les témoignages - les dépositions	- La conversation téléphonique -Les écrits journalistiques - La bande dessinée - Les documents sonores - Les extraits de film - Le roman photo
La prise de parole	- Prendre la parole - Participer à un débat - Présenter un exposé oral - Organiser un discours - Intervenir en public	- Relier les informations au moyen des pronoms relatifs - La précision du vocabulaire - La cohérence	- Exposé oral - Débat	- Sources sonores audio-visuelles - La mimogestualité - débats radiophoniques

		- Les registres de langues		
La vie associative	- Donner un conseil - Interdire -Passer une consigne	- L'impératif - Le conditionnel - Le futur simple - Le subjonctif	- Les notices - Les modes d'emploi - Les rapports - Les exposés	- Les règlements intérieurs des jeux - Les notices - Les modes d'emploi - Les consignes
La vie socio-professionnelle	- Les formes d'emploi (vocabulaire du monde du travail) - Rédiger un CV - Faire un exposé pour présenter son expérience	- Utilisation des connecteurs - Formuler une définition.	- Les C.V - Demandes d'emploi - Les rapports - Les exposés	-Demande d'emploi - Les C.V - Les profils de postes
La description	- Interroger pour obtenir des informations et des explications - Rédiger un compte-rendu de visite - Décrire des installation - Décrire les mouvements	- Les formes, les couleurs, la mise en relief, les adjectifs pur caractériser	- Textes techniques - Modes d'emploi - Guide de l'utilisateur	- Textes techniques - Modes d'emploi - Guide de l'utilisateur.

Outcomes
At the end of the course, students should be able to interact in all social situations where French is used

FRE 102: FUNCTIONAL FRENCH 2 2 credits (20-10-0)

Objectives:
A la fin de la formation, l'aprenant doit avoir une bonne connaissance de la langue française pour mieux répondre à l'option politique du bilinguisme national et mieux s'intégrer au contexte socio-professionnel.

Content:
A la fois thématiques et morphosyntaxiques, l'accent sera mis sur :

- La grammaire ;
- Les variétés de français ;
- La communication ;
- La vie de l'entreprise ;
- L'étude et la production de textes.

Supports nécessaires à l'atteinte des objectifs :

- La lettre ;
- Le rapport ;
- Les textes littéraires ;
- Les coupures de journaux ;
- Les documents audio-visuels ;
- Compte rendu écrit ou oral des visites d'ateliers ;
- Textes descriptifs et narratifs ;
- Documents iconiques ;
- Le roman-photo ;
- Les exposés ;
- Les débats, etc…

N.B. : Les textes choisis devront tenir compte des spécialités.

Contenus thématiques	Savoir-faire linguistiques	Objectifs grammaticaux	Types de texte à produire	Supports didactiques
Communication	- Défendre un point de vue - Convaincre - persuader -Exprimer son opinion - Exprimer ses goûts - Donner des informations - Prendre des notes - Utiliser les sources d'informations orales et écrites - Situer dans le temps et dans l'espace. - Etablir une relation de cause et de conséquence. - Emettre des hypothèses.	- Les articulateurs logiques - La concession La négation polémique - Les données chiffrées - Les pronoms personnels - Les temps des verbes - Les indicateurs de chronologie (au début, d'abord, ensuite, puis, enfin, finalement etc…) - Les temps du récit passé composé, présent plus-que-parfait, le futur antérieur, l'imparfait -Antériorité, simultanéité, postérité - La nominalisation - Verbes exprimant une relation de cause/conséquence - L'hypothèse (si + Présent, si+imparfait, si+plus-que-parfait)	- Messages publicitaires - Discours de campagne Interview de personnes célèbres -Résumé de films -La lettre personnelle - La lettre officielle - La demande d'emploi - Le compte-rendu - Le rapport -Biographie - Le fait divers - Le texte informatif - Textes explicatifs - Lettres d'excuse - Rapports policiers	- Débats - Sources audio-visuelles - Les professions de foi - Les textes publicitaires, les manifestations et les tracts - Les tableaux et les chiffres - Tous les types de lettre - La carte de vœux - Curriculum vitae biographie des personnes célèbres, récits autobiographiques, coupures de presse - Faits divers - Textes scientifiques - Enquêtes policières
Discours rapport	- Rapporter les paroles de quelqu'un - Interpréter les paroles de quelqu'un	- Le discours rapporté,	- L'interview, le récit - Le dialogue associé au récit	- La conversation téléphonique -Les écrits journalistiques

	-Identifier les sources d'informations	- Les verbes introducteurs de discours rapporté - La concordance des temps	- les témoignages - les dépositions	- La bande dessinée - Les documents sonores - Les extraits de film - Le roman photo
La prise de parole	- Prendre la parole - Participer à un débat - Présenter un exposé oral - Organiser un discours - Intervenir en public	- Relier les informations au moyen des pronoms relatifs - La précision du vocabulaire - La cohérence - Les registres de langues	- Exposé oral - Débat	- Sources sonores audio-visuelles - La mimogestualité - débats radiophoniques
La vie associative	- Donner un conseil - Interdire -Passer une consigne	- L'impératif - Le conditionnel - Le futur simple - Le subjonctif	- Les notices - Les modes d'emploi - Les rapports - Les exposés	- Les règlements intérieurs des jeux - Les notices - Les modes d'emploi - Les consignes
La vie socio-professionnelle	- Les formes d'emploi (vocabulaire du monde du travail) - Rédiger un CV - Faire un exposé pour présenter son expérience	- Utilisation des connecteurs - Formuler une définition.	- Les C.V - Demandes d'emploi - Les rapports - Les exposés	-Demande d'emploi - Les C.V - Les profils de postes
La description	- Interroger pour obtenir des informations et des explications - Rédiger un compte-rendu de visite - Décrire des installation - Décrire les mouvements	- Les formes, les couleurs, la mise en relief, les adjectifs pur caractériser	- Textes techniques - Modes d'emploi - Guide de l'utilisateur	- Textes techniques - Modes d'emploi - Guide de l'utilisateur.

Outcomes
At the end of the course, students should be able to interact in all social situations more especially in Engineering and Technology where French is used

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CEC 201: COMPUTER SYSTEMS 4 credits (40-20-0)

Objectives
By the end of this course, students should understand:

- Processors and how they work
- Backing store
- Peripheral devices
- Computer selection for specific applications i.e. computers to meet specification of requirement, performance evaluation of selected system, etc.

Content
- Processors and how they work
- Backing store
- Peripheral development
- Selection of computers for specific applications

Outcomes:
At the end of the course, students should be capable of choosing the right computer for a specific application

---

CEC 202: NETWORK MANAGEMEN 4 credits (30 – 10 -20)

Objectives

By the end of this course, students should understand:
- Network topologies
- Network architectures
- Network administration

Content
- Structure of computer networks
- Network topologies
- Network protocols
- Network administration

Outcomes:
At the end of the course, students should understand the basics in Network topologies, architectures and administration

---

CEC 205: COMPUTER ARCHITECTURE I 4 credits (40-10-10)

Objectives:
By the end of this course, students should understand:
- Distinguish between the operating systems
- Distinguish between the various computer systems
- Explain how the computer architecture is organised
- Explain the internal structure and operations of specific microprocessors and their generations.

Content:
- Distinguish operating systems on present day computers

- Computer interfacing and data transmission
- Microprocessors-structure and operations
- Commercially available microprocessors units

Outcomes:
At the end of the course, students should be capable of distinguishing between operating systems and understand the basic operations of a microprocessor

---

CEC 206: SYSTEM ANALYSIS 4 credits (30-10-20)

Objectives
This course encourage students to focus on a system and equally enables them to develop the methodologies for gathering information, modelling and specifying the requirements of the system.

Content
- Information gathering
- Data flow diagramming
- Data Modelling
- Requirements analysis
- Project management

Outcomes:
At the end of the course, students should be capable of gathering information, modelling and specifying the requirements of the system.

CEC 207: COMPUTER FOR BUSINESS 3 credits (40-20-0)

Objectives:
At the end of the course, the student should be able to:
- Know related computing concepts;
- Have a practical hands on using computers.

Content:
- Introduction: historical background;
- Types of computers and application areas;
- Impact of computers on society;
- Current notion: e.g. information society and globalisation;
- Outline computer organisation (block structure of computers);
- Explanatory definitions and examples of basic hardware, software and networking;
- Explanatory definitions and procedures in using Computer systems (e.g. business and data processing);
- Internet working: Internet access; of Internet facilities (e.g. E-mail, WEB page access/download, file transfer). Information Services: e. commerce; mention assorted internet related protocols and standards: e.g. http, ftp, html;

- Office automation: Introductory use of word processor, graphics and spread sheet packages, database assess;
- Conceptual (abstract) view/layout of problem handled be given packages, optional, packages: presentation graphics and graphing packages;

Outcomes:
At the end of the course, students should be able to know computer related concepts

---

CEC 212: COMPUTER ARCHITECTURE II 4 credits (30-10-20)

Objectives:
By the end of the course, students should be able to:
- Explain how the computer architecture is organised
- Explain the internal structure and operations of specific microprocessors and their generations.

Content:
- Processors based programming
- Real time control applications
- Microprocessor interfacing techniques
- Configure the computer with interfaces and control units
- Microcomputer based A.D and D/A converters.

Outcomes:
At the end of the course, students should understand how computer architecture is organized

---

EEC 202: INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
2 credits (20-10-0)

Objectives:
- Equip students with the knowledge of political developments in Cameroon and the working of the Cameroon Government;
- Holders of the H.N.D, like all graduates of institutions of Higher learning should know and understand the legal and political environment in which they live and work;
- Holders of the H.N.D should know their rights and responsibilities as Cameroonian citizens.

Content:
- Survey of Cameroon political history.
- Constitutional developments in Cameroon since Re-unification.
- The division of power between the executive, judiciary and legislative
- Cameroon political parties and party politics
- The Government and the civil society.
- Pressure groups in Cameroon.
- Problems of development and nation-building.

- Government budgeting
- Managing the debt crisis.
- The foreign policy of Cameroon.
- Cameroon and her neighbours.
- The politics of trade.

Outcomes:
At the end of the course, students should have knowledge of political developments in Cameroon and the working of the Cameroon Government.

EEC 204: MATHEMATICS II 3 credits (40-20-0)

Objectives:
- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

1. INTEGRATION
- Primitives and definitive integrals
- Integrals of simple functions
- Techniques of integrations
- Partial fractions in R and integration of rational forms
- Integration of rational functions of Sinx, Cosx
- Integration of rational functions of Shx, Chx
- Integration of rational functions of x and ax-b
- Integration of $\sqrt{}ax^2+bx+c$

2. Functions of several variables, scalar and vector-valued functions
- Scalar-valued functions (definition and examples)
- Partial differentiation of scalar-valued functions
  - First order partial derivatives
  - Second order partial derivatives

  Examples: Wave equation; heat equation; Laplace equation.
- Vector fields, definition and examples
- The gradient of a scalar-valued functions
- The Laplacian of a scalar-valued function
- The Laplacian of a vector field

Remark: All discussions will be limited to R_3

3. Multiple Integrals
- Line (curvilinear) Integrals

- Definition of doble integrals and properties
- Application in calculating the area of simple geometric figures
- The Jacobian
- Change of variables
- Triple integrals
- Definition
- Application of triple integrals in calculating the volumes of simple geometric figures, centre of mass, centre of gravity
- Change of variables.

4. LINEAR ALGEBRA

D. Vector spaces, definition and examples
- Subspaces
- Linear dependence and independence
- Basis of finite dimensional vector space

E. Linear transformations
- Endomorphisms, automorphisms, isomorphisms
- Kernel and Image of linear transformation

F. Matrices
- Systems of linear equations
- Matrix representation
- Matrices
- Eigenvalue and Eigenvector problems
- Reduction of matrices

1st case: n distinct eigenvalues

2nd case: Eigenvalues with order of multiplicity greater than one

Outcomes:
At the end of the course, students should be able to understand the concepts of algebra and matrices as related to computation

---

EEC 206: PHYSICS II 3 credits (40-20-0)

Objectives:
Develop the capacity to apply physics principles to electrical engineering problems.

Content:

Electromagnetism :
- Magnetism , Magnetic Field and flux, Magnetic circuits
- Ampere Theorem
- Biot and Savart Law
- Energy and magnetic forces

Waves :
- Free Oscillations
- Progressive waves

- Electromagnetic Waves

Thermal phenomena:

- Heat transmission
- Thermal dissipation of materials

Outcomes:
At the end of the course, students should be capable of applying physics principles in engineering fields

---

EEC 208: PROGRAMMING I 3 credits (30-10-20)

Objectives:
This course uses the programming approach to teach students the principles of software engineering and provides an opportunity for them to learn about object-oriented design.

Content:

- Software development analysis
- Requirement analysis
- Programme Design
- Implementation
- Testing
- Maintenance

Outcomes:
At the end of the course, student should understand the basic structure of an algorithm and basic principles of software engineering

---

EEC 209: MATHEMATICS I 3 credits (40-20-0)

Objectives:

- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

8. DISCRETE MATHEMATICS
   - Logic
   - sets, relations and correspondence

9. CALCULUS

A/ Functions of real variable

- Domains and codomains
- Limits and continuities
- Odd and even functions

- Limits at the extremities at the domain of definition
- Derivatives and their applications
- Table of variations and curve tracing
- Rolle's theorem and mean-value theorem of differential calculus.

B/ Trigonometric functions and inverses

- Hyperbolic functions and inverses

C/ Taylor series

- nth degree polynominal approximation of function in the neighbourhood of zero
- regular and complementary parts of a taylor series, taylor series in the neighbourhood of zero of the functions Sinx, Cosx, Tanx, ex, e-x, In(1+x), ArgSinx, ArgCosx, ArgTanx, Coslix, Sunlix, Arcosh, ArgSinx and Argtalix.
- Applications to the study of thee behaviour of functions.

10. SEQUENCES OF REAL NUMBERS
    - Definition of a sequence of real numbers
    - Convergence of sequences
    - Monotonic sequences
    - Caudry sequences
    - Geometric and arithmetic progression

11. DEFINITION OF A FUNCTION
    - Behaviour of a function of a real variable
    - Domain of definition
    - Limits and even functions
    - Domain of study
    - Limits at the extremities of the domain of definition
    - Derivatives and application
    - Table of variation
    - Curve tracing
    - Rolls theorem
    - Mean-value theorem in differential calculs.

12. TRIGONOMETRIE AND INVERSE TRIGONOMETRIC FUNCTION
    - Hyperbolic functions and their inverses

13. TAYLOR SERIES
    - 4_{th} degree polynomial approximation of function in the neighbourhood of zero
    - Regular and complementary terms of a taylor expansions
    - Tailors expansion formula for elementary functions in the neighbourhood of zero: Sinx, Cosx, Tanx, expx, exp-x, In(1+x), Arc cosx, Arc sinx, Arctana, Cohx, Sinhx, Arg coshx, Argsinhx, Argtanhx.

    Applications in studying the behaviour of functions.

14. GEOMETRY

Conic Sections: circle, ellipse, parabole, hyperbola

- Graphs, Parametric representation
- Tangents and Normals
- Applications.

Outcomes:
At the end of the course, students should be able to understand the concepts of calculus as related to computation

---

EEC 211: PHYSICS I 3 credits (40-20-0)

Objectives:

Develop the capacity to apply physics principles to electrical engineering problems.

Content:

Mechanics :

- Mechanics of a single particle
- Solid Mechanics
- Potential and kinetic energy
- Statics
- Dynamics

Electricity :

- Charges and charge density
- Electric current and current density
- Complex and vector representation (Fresnel diagram)
- Electrostatics : Electric field , electric dipoles, Gauss Theorem, Poisson equation, Energy , Electric potential

Outcomes:
At the end of the course, students should develop the capacity to apply physics principles to electrical engineering problems.

EEC 213: MATERIAL SCIENCE 3 credits (40-20-0)

Objectives:
The purpose of this course is to provide the student with the knowledge of electrical properties of materials and thus selection for engineering uses, with natural and electrical properties of materials.

Content:
HND:

- Atomic models
- Einstein's and atomic models
- Uncertainty and Pauli exclusion principles
- Energy bands
- Structures of solids
- Thermal and optical properties
- Electrical and magnetic properties of material

Outcomes:
At the end of the course, student should have a knowledge of electrical properties of materials and thus know the materials for engineering uses

EEC 215: DIGITAL ELECTRONICS I 3 credits (40-10-10)

Objectives:
By the end of this course, students should be able to:

- Understand the concept of data and information presentation in digital systems
- Understand the different codes used in digital systems
- Understand basic logic functions
- Understand the basic digital logic functions
- Understand the design of simple combinational logic circuits using the basic logic devices:
- Understand the basic principles of bitable devices

Content:
I. Generalities:

1. number systems:
    - Natural number systems
    - Whole numbers
    - Integers
    - Rational number system
5. number representations:
    - Decimal representations
    - Binary representations and algorithms
    - Hexagonal representation and algorithms
    - Octal representations
    - Binary arithmetic and algorithms
    - Round off errors
    - Conversion from one system to another.

II. Different codes:

- Binary
- Decimal
- Gray
- Ascii
- Conversion from one code to another

III. Logic gates:

- Fundamental logic gates (OR and NOR)
- Other gates;
- Combination of logic gates
- Diode and transistor as switch
- Different logic families (DRL, DIL, TTL, RTL);
- Main digital IC circuits (TTL and characteristics, CMOS and characteristics)

IV. Combinational logic circuits:

- Explain the principle of operation of combinational logic
- Write down a logical sum of product equation
- Fundamental of Boolean algebra
- Selection of method
- Venn diagram
- Karnaugh map
- Simplification using different methods
- Practical different examples
- Adder, substractor, multiplier, counter down
- Mutiplexers and dimultiplexet

W. Programmable logic devices:ROM, PLA, PAL, FPGA

Outcomes:
At the end of the course, students should know the basic principles in the design and implementation of combinational logic circuits

---

EEC 222: OPERATING SYSTEMS 4 credits (30-10-20)

Objectives:
By the end of this course, students should understand:

- Operating systems
- Different operating systems e.g. DOS, Windows and Unix
- Different operating systems for different platforms

Content:

- Operating systems concepts
- Working with different operating systems
- Selection of operating systems for different platforms

Outcomes:
At the end of the course, students should be able to understand different operating systems

---

CEC 301: DATABASE MANAGEMENT SYSTEMS 4 credits (40 – 10 – 10)

Objectives
Students are expected to understand basic concepts in database management systems as well as to get some practical hands-on experience with commercial database management systems through a small project of designing and implementing a database application system

Content

- Data base concepts
- Data models
- Data base design concepts and noramization

- Introduction to SQL
- Introduction to PL/ SQL
- Advanced data base concepts

Outcomes:
At the end of the course, students should be able to manage commercial database systems

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CEC 302: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING
4 credits (40 – 10 –
10)

Objectives
This course teaches object oriented programming to students who have learnt basic programming concepts and are ready to learn in-depth programming. It focuses on object-oriented programming using C++.

Content

- Classes
- Members
- Procedures versus Objects
- Class Design
- Data Modelling
- Introductory STL
- Iterators and containers
- Overloading
- Inheritance
- Virtual Methods
- Abstract classes
- Destruction and Polymorphism
- Stream I/O in C++
- Templates
- Exception Handling

Outcomes:
At the end of the course, students should have in-depth understanding in C++ programming

---

CEC 303: RELATIONAL DATABASE 4 credits (40 – 10 –
10)

Objectives
Students should be able to analysis data, design a relational database, develop relational database applications and test developed databases.

Content
- Data analysis
- Relational database design
- Relational database development
- Testing and documentation
- Database administration

Outcomes:
At the end of the course, students should be able to analysis data, design a relational database, develop relational database applications and test developed databases.

CEC 304: DATA SECURITY AND INTEGRITY 4 credits (40 – 10 – 10)

Objectives
This course introduces students to cryptographic algorithms which are applied to data and computer networks

Content
1. Overview of Information Security
Introduction; Need of Information Security; Basic types of Security;
2. Encryption Methods
Transposition Cipher; Substitution Cipher; Caesar Cipher; Playfair Cipher; Monoalphabetic; Hill Cipher; Vigenere Cipher; One-time pad

3. Confidentiality & key management
Cryptanalysis; Types of Cryptography; Symmetric Key Cryptography; Asymmetric Key Cryptography; DES; RSA; Diffie Hellman; Kerberos; Elliptic Curve Arithmetic

4. Information Hiding and data integrity
Steganography; Digital Signature; Audio and Video Watermarking; Birthday Attack; Hash Function; RC-5; MD-5; SHA

5. Authentication and identity management
Passwords; MAC; Digital Certificates; Session Keys; Smart Card; Biometrics; Trusted Servers

6. Software Vulnerabilities and Firewalls
- Types of Vulnerabilities:
  Virus; Worm; Trojan Horses Zombies; Trap Doors;

- Types of Attacks

Back-Door Attack; Brute Force Attack; Dictionary Attack; DoS Attack; Distributed DoS Attack; Man-in-the-Middle Attack

- Firewalls

Characteristics of Firewall; Types of Firewall

7. Web and Network Security
SSL/TLS; SSL Objectives and Layers; IP Security Architecture

Outcomes:
At the end of the course, students should understand encryption algorithms and key management methods in a security association

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CEC 305: DATA STRUCTURE AND ALGORITHM 4 credits (40 – 10 – 10)

Objectives
The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about showing the correctness of algorithms and studying their computational complexities

Content
- Application and implementation of strings, arrays, stacks queues, lists, trees and graphs. Abstract data types; storage management.
- Sorting, searching, merging, reference and cross-referencing files.
- Design and analysis of algorithms, complexity of algorithms, big-O and small-O notation. Binary trees, B-trees, B*-trees, and AVL-trees.
- Study of disk and tape file organizations. Creation of sequential, direct, and indexed sequential files.
- Hashing techniques and address overflows.
- Primary and secondary key usage, inverted and linked-list files.
- Semantic Nets, frames

Outcomes
At the end of the course, students should understand how to select and design data structures and algorithms that are appropriate to problems encountered.

CEC 307: FUNDAMENTALS OF SOFTWARE ENGINEERING
4 credits (40 – 10 –
10)

Objectives
Students will know the fundamental data structures and techniques used in computer science. They will employ good programming principles and know why these principles are important in constructing quality software. They will be competent in using arrays and structures.

Content
- Introduces to the foundations of programming and testing.
- Software quality and how it can be achieved
- Frameworks for problem solving in terms of fundamental data structures and algorithms.
- Data structures include arrays and structures. Techniques include functions, recursion and use of libraries.
- Analysis of algorithms, including measures of complexity.
- Implementations of the basic algorithms in a programming language.

Outcome
On successfully completing of this course, students will be able to write and test small programs.

COT 302: INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
2 credits (20 – 10 – 0)

OBJECTIVES:

- To equip the student with the basic legal principles and concepts essential for an understanding of the legal environment in which he functions.
- To create an awareness of basic human rights and how they can be enforced or protected within the professional context.
- To acquaint the student with the basic texts pertinent to environmental protection and sustainable development.

CONTENT:

PART ONE: Introduction to law:

- The definition of Law
- The classification of Law;
- Sources of Law;
- Laws and Enabling Acts (Texts of Application);
- The concept of legal personality;
- Civil Responsibility (i.e Contract, TORT);
- Criminal Responsibility:
- The Courts and their Jurisdictions;
- Labour Law: formation and execution of the labour contract, remuneration, conditions of work, obligations of the employer and employer and employee, Termination of the labour contract.

PART TWO: Fundamental Rights

- The concept of Human Rights: problem of Definition and context;
- Sources of Human Rights;
- Major international Conventions on Human Rights;
- International conventions relating to women, children and the rights of minorities;
- The Role of the Judiciary and the legislature in the protection of Human Rights;
- The Cameroonian National Commission on Human Rights and Liberties;
- The Civil Society, NGO's and the protection of Human Rights,
- Freedom of expression and the Rights to privacy;
- Violation of Human Rights and Remedies;
- Environmental Protection;
- Pollution, Waste disposal and hazardous activities.

Outcomes
At the end of the course, students should understand the basic legal principles and fundamental rights.

COT 304: LEGAL ASPECTS RELATING TO BUSINESS 2 credits (20 – 10 – 0)

Objectives:

The course should introduce the student to some fundamental with reference to the industrial and technological fields.

Content:

1. Intellectual Property Law
    - World Intellectual Property Organisation (WIPO); Treaties and their implementation;
    - Patent law
    - Design law;
    - Trade and service marks law;
    - Copyright law;
    - Computer and technology law: fundamentals and computer, contracts, computer fraud and tracking;
2. Law of arbitration
    - Notions of arbitration;
    - Other alternative techniques of resolving conflicts: mediation, negotiation, conciliation and reconciliation…
    - Arbitration agreements;
    - Arbitration tribunals;
    - Proceedings;
    - Awards: recognising, enforcing and resisting awards;
    - Applicable laws;
    - Impact of the OHADA Treaty
3. Company Law
    - Formation of companies;
    - Types of companies;
    - Running and management of companies;
    - Insolvency, liquidation and winding up.
4. Taxation Law
    - Fundamental principles of taxation;
    - Fiscal and customs reforms within the CEMAC;
    - Methods of tax imposition on companies;
    - Types of tax regulations.

Outcomes

At the end of the course, students should understand the basic legal principles and concepts essential for an understanding of the legal environment

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COT 305: MATHEMATICS III 3 credits (40-20-0)

Objectives:

- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.

- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

8. LINEAR DIFFERENTIAL EQUATIONS
   - Complex numbers, linearization
   - 1st order linear differential equations
     - Definition and examples (physics)
     - Solving the associated homogeneous equation
     - Solving the complete linear differential equation of first order.

9. LINEAR DIFFERENCE EQUATIONS OF FIRST AND SECOND ORDER AND METHODS OF SOLUTION

10. SOLVING SYSTEMS OF DIFFERENTIAL EQUATIONS OF THE FORM

$$\frac{Dx}{Dt} = AX + B, X = [\ ], A\varepsilon\square \quad 2\times 2\ (R)$$

$B \varepsilon\square$ n x 1 ®

11. SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS
    - Definition and examples
    - Solving the associated homogeneous equation
    - Characteristic equations

12. FOURIER SERIES
    - Periodic functions
    - Definition of the Fourier Series of a 2T-periodic functions and formulas to calculate the coefficients au, an and bn
    - Definition of Fourier series of 2T-periodic functions (T>0) and formulas to calculate the Fourier coefficients.
    - Applications in signal processing.

13. OPERATIONAL CALCULUS
- Definition of the Laplace transform and examples
- Laplace transform of a translation, of the derivative of a function, Laplace transform of a constant and exponentials
- Inverse Laplace transforms.

Remark: Proofs and knowledge of proofs is not required

14. PROBABILITY AND STATISTICS.

A. PROBABILITY

- Definition of probability and properties;
- Conditional probabilities;
- Baye's theorem;

- Random variables;
- Moments;
- Expectation, variance, standard deviation;
- Chehychev's sky inequality

B. PROBABILITY DISTRIBUTIONS

- Discrete distributions;
- Bernouilli's distributions;
- Binomial distributions;

    - Continuous distributions;
        - Uniform distributions;
        - The Normal distributions;
        - The Poisson distributions.

C. STATISTICS

- Descriptive statistics;
- Graphical representation;
- Central tendency, dispersion (mean, mode, median, variance and standard deviation, deciles and interquatile range);
- Covariance;
- Correlation coefficients and regression;
- Least square methods;
- Estimation of the mean and the standard deviation;
- Confidence intervals;
- Test of hypothesis.

Outcomes:
At the end of the course, students should be able to understand the concepts of statistics and probability as related to computation

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COT 306: INDUSTRIAL EXPERIENCE 10 credits (20 – 0 – 40)

Objectives:

This is an essential aspect of the training aimed at giving industrial practical and motor skills to students.

Organisation:

The workshop or industrial experience shall be carried out either within a block period of not less than three months per academic year. Alternatively, where workshop exist in a school, it shall be preferable to have industrial practice of 8 to 10 hours a week.

COT 307: PRINCIPLES OF MANAGEMENT 2 credits (20-10-0)

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

- Plan, organise, co-ordinate or guide the activities and efforts of subordinates in achieving set goals in the most economical and efficient manner possible.
- Understand and apply management theory to the running of any middle size enterprise.
- Overcome the complexities in modern management.

Content:

- Defining management in general terms;
- Development of modern management thought:
  - Behavioural school;
  - Management process school;
  - Quantitative school;
  - Integrated approach;
  - Systems approach;
  - Contingency approach;
- Planning, organizing, motivating, and controlling as applied to the management of a business;
- The functional field of production/operations management;
- Communication in modern management;
- Leadership, problem-solving techniques, coordination, and human relations necessary for successful management;
- Human resource planning;
- The job;
- The staffing process and compensation schemes;
- Decision making in management.

Outcomes:
At the end of the course, students should be able to plan, organise, co-ordinate or guide activities and efforts in achieving set goals

---

EEC 301: DIGITAL ELECTRONICS II 4 credits (40-10-10)

Objectives:
The course gives the student an opportunity to understand and master basic sequential logic tools.

Content:

5. FLIP FLOPS
   - R-S flip flop
   - J-K flip flop
   - Timing parameters
   - Applications
   - Finite State Machines(FSMs)

- ❖ Moore machine
- ❖ Mealy machine

6. Counters
   - Asynchronous
   - Synchronous
   - Up/Down counters
   - Decade and BCD counters
   - Decoding a counter
   - Cascading counters
   - Designing counters with arbitrary sequences
7. Registers
   - Serial-in shift registers
   - Parallel-in shift registers
   - Bidirectional shift registers
   - Universal shift registers
   - Shift register counters
8. Data conversion circuits
   - D/A converters
     - ❖ D/A converter specifications
     - ❖ Types of D/A converters
     - ❖ D/A converter applications
   - A/D converters
     - ❖ A/D converter specifications
     - ❖ Types of A/D converters
     - ❖ A/D converter applications
   - Application to 68000 Motorola microprocessor

Outcomes:
At the end of the course, students should know the basic principles in the design and implementation of combinational logic circuits

---

EEC 302: DIGITAL ELECTRONICS LABORATORY 4 credits (0 – 0 – 60)

Objectives: Students will be capable of designing, analyzing and observing an digital electronic circuits.

Contents:

- Arithmetic Circuit- construction and testing using 74xxICs
  - Half adder and Full adder.
  - Half subtractor and Full subtractor.
- Combinational logic circuit design using 74xxICs.
- Encoders and Decoders.
- Multiplexer and Demultiplexer.
- Study of Arithmetic Logic Unit(ALU) using IC 74181.

- Construction of 1- bit comparator using 74xxICs and study of 4-bit comparator IC 7485.
- code converters – Binary to gray and Gray to binary.
- Verification of basic flip flops using 74xxICs and master- slave JK flip-flop using IC 7476
- Asynchronous counter design and Mod-n counter.
- 3-Bit synchronous counter design
- Shift register- SIPO/SISO & PISO/PIPO.
- Study of RAM.

Outcomes: At the end of the course, the student should be capable of designing, implementing and troubleshooting basic digital electronics circuits

---

CEC 402: INTRODUCTION TO EMBEDDED SYSTEMS 4 credits (30 – 10 – 20)

Objectives: Embedded software is used today everywhere in computers used in cellphones, pagers and cars to computer systems for medical diagnosis, climate control and power generation. It has to run in real-time, concurrently, sometimes distributed over a network. The objective of the course is to study the hardware requirements posed by embedded systems, their software architecture and operating systems and to learn an object-oriented modelling methodology for embedded systems.

Contents:
1. Introduction to Embedded Systems
2. Hardware fundamentals for Software Engineers.
3. Sensors
4. Networks for Embedded Systems.
5. Survey of Software Architectures.
6. Modelling Real-Time Systems
7. Introduction to Rational Rose RealTime UML
8. Capsule Structure and Behavior.
9. Mapping Requirements to Design.
10. Model Hierarchies.
11. Real Time Operating Systems
12. Design Using a Real-Time Operating System.
13. Development Tools.
14. Debugging Techniques.

Outcomes: At the end of the course, student should be capable of implementing embedded systems

---

CEC 404: DIGITAL SIGNAL PROCESSING 4 credits (40-20-0)

Objectives:
By the end of this course, students should understand:

- the fundamental concepts which form the foundation of digital signal processing
- filtering techniques
- Modelling of signals
- Sampling of signals

Content:

I/ Fundamental concepts

- Sequences
- Signal manipulations
- Discrete-time system properties
- Convolution
- Difference equations
- Block diagram

II/ Z-Transform.

- Relation between unit-sample response and transfer function
- Forward Z-transform.
- Inverse Z-transform.
- Properties of Z-transform.
- Application to solving difference equations.

III/ Fourier analysis

- Fourier series
- Fourier transforms
- Discrete-time Fourier Transform (DTFT)

IV/ Discrete Fourier Transform (DFT)

- Primitive roots of unity
- Discrete Fourier series
- Discrete-time Fourier Transform
- Discrete Fourier transform and properties
- Fast Fourier Transform (FFT)

V/ Digital filtering of analog signals

- Sampling
- Data reconstruction
- Digital processing of analog signals

VI/ Filter structures

- Types of filters

- Digital filter realizations

Outcomes:
At the end of the course, students should understand basic principles in digital signal processing

---

CEC 409: INTERNET APLLICATION PROGRAMMING 4 credits (40 – 10 - 10)

Objective: familiarize with the language and tool necessary in developing an application based on Internet architecture and protocols.

Content
- Introduction to internet, web browser and others services protocols (FTP, HTTP, …)
- Creating HTML documents
- Programming Cascading Sheet Style (CSS) and DHTML
- Interactive programming using ASP .Net, JavaScript and Applets
- Server side programming (Servlet), script language and processor (PHP)

Outcomes:
At the end of the course, students should have an understanding of the language and tool necessary in developing an application based on Internet architecture and protocols.

CEC 410: DESIGN WEBSITE PRACTICALS 4 credits (0 – 0 – 60)

Objective: at the end of this course, the students must be able to
- Configure the running environment for Internet applications,
- Develop and install an application

Content:
- Choosing, installing and configure a web server: APACHE/IIS/…
- Installing and configure a language processor: PHP, …
- Case study: designing, writing and installing a web application.

Outcomes: At the end of the course, the student should be able to design and implement websites

---

CEC 411: MODELLING IN INFORMATION SYSTEMS 4 credits (30 –20 – 10)

Objectives
The student should:
(i) Be able to demonstrate sufficient understanding of the various modeling tools and techniques;

(ii) Be able to model an information system using the Universal Modelling Language (UML);
(iii) Be able to model business processes;
(iv) Select a suitable modeling language based on the context; and
(v) Be able to evaluate the quality of models using model checking tools and formal methods

Content

- Modelling the enterprise: Object-oriented concepts, object-oriented enterprise modelling.
- Modelling the business process: process and workflow modelling, IDEF0, and SAP R/3 process models,
- Modelling the dynamics: Data flow diagram (DFD), structured English, decision table, decision tree, and state-transition diagram.
- Modelling the structures: Entity-relationship (ER) models.
- Putting the designs together: Unified Modeling Language (UML) Evaluation of methods: Evaluation criteria.

Outcomes: At the end of the course, the student should be able to use the UML to model enterprises and business processes

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CEC 412: INTRODUCTION TO VIRTUAL INSTRUMENTATION
4 credits (30 –20 –
10)

Objective:
- To impart knowledge on the concepts of virtual instrumentation
- To provide knowledge on the data acquisition

Content
- Definition of VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming
- Programming techniques, loops & charts, graphs, case & sequence structures, formula modes, local and global variable, string & file format
- Application of VI: Application in Process control designing of equipment like Oscilloscope, Digital Multimeter using Lab view virtual instrumentation software

Outcomes
The students will be able to write simple programs to implement basic electrical/ electronic measurements and data acquisition

---

CEC 413: SOFTWARE DEVELOPMENT 4 credits (30 – 20 – 10)

Objective:
Familiarize the student with the Object oriented development approach based on the UML language

Content
- Requirements specification
- System design: system static architecture, system dynamic
- Coding and testing
- Installation: creating a package of installation

Outcomes
At the end of the course, the students should understand the Object oriented development approach based on the UML language

---

CEC 414 : INTRODUCTION TO ARTIFICIAL INTELLIGENCE SYSTEMS
4 credits (40 – 20 – 0)

Objective: To acquaint the students with the important artificial intelligent methodologies

Content:
- Artificial intelligent systems: Neural networks, Fuzzy logic and Evolutionary programming concepts
- Artificial Neural Networks (ANN): Biological neural networks, model of an artificial neuron, comparison between biological neuron and artificial neuron, basic models of ANN, activation function and terminologies of ANN, Mc Culloch Pitts neuron, Linear separability, Hebb Network, Perceptron Networks, Adaline, Madaline

Outcomes
The students will be able to define and appraise the major areas of AI research and use. They will be able to write simple programs to demonstrate aspects of AI using a suitable programming language.

CEC 415 : DISTRIBUTED PROGRAMMING 4 credits (30 – 20 – 10)

Objective: This course is to familiarize students with the technologies underlying distributed applications

Content:
- Socket programming with Java or C#
- Accessing a remote object throughout RMI
- Web service: SOAP Protocol, XML
- Practical exercises in Java and .Net

Outcomes

At the end of the course, the students should understand the technologies underlying distributed applications

---

CEC 417: MOBILE APPLICATION DEVELOPMENT 4 credits (30 – 20 – 10)

Objectives
The student should:

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

Content
This project-oriented course examines the principles of mobile application design and development. Students will learn application development on the Android platform. Topics will include memory management; user interface design; user interface building; input methods; data handling; network techniques and URL loading; and, finally, specifics such as GPS and motion sensing.

Outcomes
At the end of the course, the students should design, implementation, and pilot test mobile phone software applications.

CEC 419: DESIGN PROJECT 6 credits (0 – 0 – 60)
Objectives: Under the care of a teacher, a supervised project must permit a student to design and implement a set-up which is relevant to the society

Content:
The problematic of the subjects related to these projects are based on the following themes; however, the list is inexhaustible:

- The function of Analogue Electronics
- The function of digital electronics
- Instrumentation
- Software system design and analysis
- Internet technology
- Computer networks

----- etc

Outcome: At the end of the course, the student should be able to design and implement set-ups addressing the needs of the society

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CEC 498: BTECH PROJECT 10 credits (0 – 0 – 60)

Objectives: Under the care of a teacher, a supervised project must permit a student to :

- Master how to carry out the scaling of setups which can either be of an elaborated form or are not prototypes or are parts of prototypes and destined to verity a function or a set of electronic function.
- Put in place, exploit and maintain electronic systems

Content:

The problematic of the subjects related to these projects are based on the following themes; however, the list is inexhaustible:

- The function of Analogue Electronics
- The function of digital electronics
- Instrumentation
- Software system design and analysis
- Internet technology
- Computer networks

----- etc

Outcome: At the end of the course, the student should be able to master the structure of a scientific write-up

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COT 401: ENTREPRENEURSHIP 4 credits (40 – 20 – 0)

Objectives:

Upon completion of this course, the student will be able to:

- Define entrepreneurship within the context of society, organizations and individuals.
- Demonstrate an understanding of the impact of entrepreneurship on the economy.
- Recognize entrepreneurial attitudes and behaviors within him/herself and others.
- Distinguish between an entrepreneurial and a conventional approach to management.
- Recognize and overcome obstacles to creative problem-solving.
- Describe the elements of an effective business model/plan.
- Develop a concept for an innovative product or service in his or her own area of interest.
- Recognize that entrepreneurial success in the 21 st century depends on teamwork and diversity.
- Develop a personal framework for managing the ethical dilemmas and social responsibilities facing entrepreneurs.
- Describe the leadership styles of entrepreneurs who have been successful in different sectors (e.g., start-ups, corporations, community, public sector, etc.).

- Identify traits/characteristics of an entrepreneur/intrapreneur as exhibited in behavior.
- Analyze elements of the entrepreneurial mind set and discuss the implications for functioning as a successful entrepreneur.

Content:

I. Entrepreneurship
- Definition and philosophy
- History
- Role within the economy

II. Entrepreneurship in different contexts
- Social (donating profits, "doing good", non-profit)
- Organizational (start-ups, corporate, public sector)
- Individual (career management)

III. Types of new ventures
- Franchises
- Family businesses
- Business-within-a-business (entrepreneurship)
- Start-ups

IV. Entrepreneurial style
- Nature vs. nurture (personality traits, teachable behaviors)
- Strengths and weaknesses
- Sustainable across time and organizational settings

V. Creative problem-solving
- Courage to create
- Overcoming obstacles
- Selling your idea to others

VI. The entrepreneurial management process
- Opportunity and the entrepreneur
  - Recognizing and testing opportunity
  - Developing and testing the business concept
  - Building a team (diversity, roles)
- Analyzing and testing opportunity
  - Analyzing industry risks and benefits
  - Analyzing customer risks and benefits
  - Analyzing product/service risks and benefits
  - Analyzing financial and legal risks
- Preparing for the future - planning for growth

X. Business concepts/models
- From solution to innovative product/service
- From product/service to business concept (value proposition)
- From business concept to feasibility study

XI. Ethics and social responsibility
- Dilemmas and choices (partners vs. solo, money and control, technology and innovation, etc.)
- Giving back to the community
- Case studies

XII. Entrepreneurs as role models
- Famous (and not so famous) entrepreneurs and what we can learn from them
- Differences in experience and leadership style

Outcomes:
At the end of the course, students should be able to model and plan a small business

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UNDERGRADUATE STUDIES

Department of Electrical and Electronic Engineering

Qualification Offered: Bachelor of Technology

OPTION: Electrical Technology
Duration of Studies: 3 Years

OBJECTIVES OF DEGREE PROGRAMME:

The objectives of the B.Tech in Electrical and Electronic Engineering programme with option in electrical technology are:

- To produce graduates who are well-educated in the fundamental concepts of power systems and engineering;
- To produce graduates who are capable of continuing their professional development throughout their career by combining theory with its application in Electrical and Electronic Engineering practice;
- To build human resource capacity in the electrical technology discipline in both the public and private sectors to students who wish to become proficient in developing traditional and renewable energy systems using a methodical approach;
- To produce graduates with good communication skills capable of functioning responsibly in diverse environments and able to work in teams;
- To produce graduates who are innovative and are capable of creating jobs.

SKILLS TO BE ACQUIRED:

At the end of the programme, the following skills should be acquired:

- Ability to understand sophisticated techniques in PC repair, including external I/O devices, printers, mobile computing devices, purchasing and building PCs, troubleshooting, support, virus protection, data protection, and recovery.repair and main.
- Ability to understand how computers communicate with each other, how computers are grouped together to form networks, networking concepts and issues that are key to the successful implementation of computer networks, and the different networking implementation strategies and technologies currently available.

EMPLOYMENT OPPORTUNITIES

The students will have opportunities in the following areas.
As a technical staff in industries related to the production, transmission, distribution and efficient use of energy

Be capable of pursuing postgraduate studies in power engineering.
Be capable of creating and managing an enterprise.

ADMISSIONS REQUIREMENTS

In addition to the general university requirements candidates must obtain a minimum of grade D at the Advanced level in Physics and Mathematics. Candidates with a "Baccalaureat" in Electrical Technology will also be admitted.

REQUIREMENTS FOR A B.TECH.

The following courses below must be successfully completed in order to obtain a B.Tech. Degree in Electrical and Electronic Engineering:

Head of Department: Ningo Ndeh Ntomambang, Ph.D.

Faculty
Sone Michael Ekonde, Ph.D.
Feudjio Cyrille, DEA, Doctoral candidate
Moffo Longla Bertrand, DEA, Doctoral candidate
Tchapga Tchito Christian, DEA, Doctoral candidate
Tchimmoue Gaby, DEA, Doctoral candidate

Laboratory Technician

Tchinda Tandjon Valery

Part time lecturers

Abuno Emmanuel, DIPET II
Acho Abongwa Willibroad, M.Sc.
Michael Foncham, M.Sc.
Ngoe Manase Masue, DIPET II
Tamanjong Fru Fofang, DIPET II

COMMON COURSES

CEC 207 COMPUTER FOR BUSINESS
COT 301 ENGLISH 2
COT 302 INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
COT 303 FRENCH 2
COT 304 LEGAL ASPECTS RELATING TO BUSINESS
COT 305 MATHEMATICS 3
COT 306 INDUSTRIAL EXPERIENCE
COT 307 PRINCIPLES OF MANAGEMENT
COT 401 ENTREPRENEURSHIP
EEC 201 FRENCH 1
EEC 203 ENGLISH 1

EEC 204 MATHEMATICS 2
EEC 206 PHYSICS 2
EEC 208 PROGRAMMING 1
EEC 209 MATHEMATICS 1
EEC 210 CIVICS AND MORAL EDUCATION
EEC 211 PHYSICS 1
EEC 213 MATERIAL SCIENCE
EEC 308 INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
EEC 411 DESIGN PROJECT
EEC 498 BTECH PROJECT
SPT 100 SPORTS

ELECTRICAL TECHNOLOGY COURSES

CEC 207	COMPUTER FOR BUSINESS
CEC 210	ELECTRO-PHYSICS
EEC 201	FRENCH 1
EEC 202	INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
EEC 203	ENGLISH 1
EEC 204	MATHEMATICS 2
EEC 205	ANALOGUE ELECTRONICS 1
EEC 206	PHYSICS 2
EEC 207	CIRCUIT ANALYSIS
EEC 208	PROGRAMMING 1
EEC 209	MATHEMATICS 1
EEC 210	CIVICS AND MORAL EDUCATION
EEC 211	PHYSICS 1
EEC 213	MATERIAL SCIENCE
EEC 219	COMPUTER AIDED DESIGN
EEC 221	ELECTRICAL DESIGN AND DRAFTING 1
EEC 232	ELECTRIC CIRCUIT THEORY 1
EEC 234	ELECTRIC DESIGN AND DRAFTING 2
EEC 236	ELECTRIC MACHINE 1
COT 301	ENGLISH 2
COT 302	INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
COT 303	FRENCH 2
COT 304	LEGAL ASPECTS RELATING TO BUSINESS
COT 305	MATHEMATICS 3
COT 306	INDUSTRIAL EXPERIENCE
COT 307	PRINCIPLES OF MANAGEMENT
EEC 304	ELECTRICAL MACHINES III
EEC 306	ELECTRICAL MAINTENANCE AND REPAIRS
EEC 307	FUNDAMENTALS OF DIGITAL ELECTRONICS
EEC 308	TESTING AND RELIABILITY
EEC 309	ELECTRICAL MACHINES II
EEC 311	ELECTRIC POWER SYSTEMS I
EEC 313	ELECTRICAL MEASUREMENT AND INSTRUMENTATION
EEC 316	ELECTRIC CIRCUIT THEORY 2
EEC 321	CONTROL ENGINEERING
EEC 332	ELECTROMAGNETIC THEORY
CEC 423	COMPUTER TECHNOLOGY FUNDAMENTALS
COT 401	ENTREPRENEURSHIP
EEC 411	DESIGN PROJECT
EEC 413	ELECTRIC POWER SYSTEM II
EEC 414	ELECTRIC POWER SYSTEMS III
EEC 415	CONTROL ENGINEERING II
EEC 416	INDUSTRIAL COMPUTING
EEC 417	POWER ELECTRONICS
EEC 418	POWER SYSTEMS LABORATORY
EEC 419	ELECTRICAL MACHINES LABORATORY
EEC 420	POWER SYSTEM ANALYSIS
EEC 422	CONTROL OF ELECTRICAL MACHINES

EEC 498 BTECH PROJECT

STRUCTURE OF PROGRAMME FOR B. Tech. IN ELECTRICAL AND ELECTRONIC ENGINEERING WITH OPTION IN ELECTRICAL TECHNOLOGY

YEAR: ONE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRSTSEMESTER						
FRE 101	Functional French 1	2	C	20	10	0	
ENG 101	Use of English 1	2	C	20	10	0	
EEC 205	Analogue Electronics 1	3	C	40	10	10	
EEC 207	Circuit Analysis	4	C	40	20	0	
EEC 209	Mathematics 1	3	C	40	20	0	
EEC 211	Physics 1	3	C	40	20	0	
EEC 213	Material Science	3	C	40	20	0	
EEC 219	Computer Aided Design	4	C	30	10	20	
EEC 221	Electrical Design and Drafting 1	3	C	30	20	10	
CEC 207	Computer For Business	3	C	40	20	0	
TOTAL		30		340	160	40	
	SECONDSEMESTER						
CVE 100	Civics And Moral Education	4	C	40	20	0	
EEC 202	Introduction to Cameroon Government and Politics	2	C	20	10	0	
EEC 204	Mathematics 2	3	C	40	20	0	EEC 209
EEC 206	Physics 2	3	C	40	20	0	EEC 211
EEC 208	Programming 1	4	C	30	10	20	
CEC 210	Electro-Physics	3	C	40	10	10	
EEC 232	Electric Circuit Theory 1	3	C	40	10	10	
EEC 234	Electric Design and Drafting 2	4	C	40	10	10	
EEC 236	Electric Machines 1	4	C	40	10	10	
TOTAL		31		330	120	60	

YEAR. TWO

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRSTSEMESTER						
FRE 102	Functional French 2	2	C	20	10	0	FRE 101
ENG 102	Use of English 2	2	C	20	10	0	ENG 101
COT 305	Mathematics 3	3	C	40	20	0	EEC 204

COT 307	Principles of Management	2	C	20	10	0	
EEC 307	Fundamentals of Digital Electronics	4	C	40	10	10	
EEC 309	Electrical Machines 2	4	C	40	10	10	EEC 236
EEC 311	Electric Power Systems 1	3	C	40	10	10	
EEC 313	Electrical Measurements and Instrumentation	3	C	30	20	20	
EEC 321	Control Engineering 1	4	C	40	20	0	
SPT 100	Sports	2	C	0	0	20	
TOTAL		29		290	120	70	
	SECONDSEMESTER						
COT 302	Introduction to Law and Fundamental Rights	2	C	20	10	0	
COT 304	Legal Aspects Relating to Business	2	C	20	10	0	
COT 306	Industrial Experience	10	C	20	0	40	
EEC 304	Electrical Machines 3	4	C	40	10	10	EEC 309
EEC 306	Electrical Maintenance and Repairs	4	C	30	10	20	
EEC 308	Testing and Reliability	3	C	30	0	30	
EEC 316	Electric Circuit Theory 2	3	C	40	20	0	
EEC332	Electromagnetic Field Theory	3	C	40	20	0	
TOTAL		30		240	80	100	

YEAR: THREE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	Prere-quisite
	FIRSTSEMESTER						
COT 401	Entrepreneurship	4	C	40	20	0	
EEC 413	Electric Power Systems 2	4	C	40	10	10	EEC 311
EEC 415	Control Engineering 2	4	C	40	20	0	EEC 321
EEC 417	Power Electronics	4	C	40	10	10	
EEC 417	Electrical Machines Laboratory	4	C	0	0	60	
CEC 423	Computer Technology Fundamentals	4	C	40	10	10	
EEC 411	Design Project	6	C	0	0	60	
TOTAL		30		200	70	150	
	SECONDSEMESTER						
EEC 414	Electric Power Systems 3	4	C	40	10	10	EEC 413
EEC 416	Industrial Computing	4	C	30	10	20	
EEC 418	Power Systems Laboratory	4	C	0	0	60	
EEC 420	Power System Analysis	4	C	40	20	0	
EEC 422	Control of Electrical Machines	4	C	40	10	10	
CEC 498	B. Tech Project	10	C	0	0	60	
TOTAL		30		150	50	160	

SUMMARY

PARAMETER	NUMBER			
	CREDITS	LECTURE TEACHING HOURS	TUTORIAL TEACHING HOURS	PRACTICAL TRAINING HOURS
Year One	61	670	280	100
Year Two	59	530	200	170
Year Three	60	350	120	310
Sub-Total	180	1550	600	580
TOTAL CREDITS				180
TOTALCONTACT HOURS				2,730

ELECTRICAL TECHNOLOGY COURSE DESCRIPTION

EEC 205: ANALOGUE ELECTRONICS 1 3 Credits (40-10-10)

Objectives:
The purpose of this course is to enable the student to understand the basic fundamentals in analogue electronics

Content:
Semiconductor theory
PN junction
Junction diodes and applications
Bipolar transistors and applications
JFET and MOSFET and applications

DIPT amplifiers (CB, CE, CC);
Transistor equivalent in AC, Equivalent circuit of the amplifiers above Explain how they function, Calculation of voltage gain, current gain, inputs and output impedances,Power gain, Compare the different amplifiers above.

FET Amplifiers (CS, CG, CD):
Transistor equivalent in AC, Equivalent circuit of the amplifiers above, Explain how they function, Calculation of voltage gain, current gain, power gain, Compare the different amplifiers above.

Frequency response of amplifiers:
Considering coupling + by pass capacitors, Cut off frequencies, Bandwidth, Bipolar and FET in HF.

Examples of low frequency amplifiers:
Power amplifiers, Different classes of power amplifiers (class A, AB, B, C) and their characteristics, Different power, efficiency, example of each class

Rectifiers
Half wave, full wave, bridge (single phase and three phase)
Filtering
Voltage regulation

Outcomes:
On completion of the course, the students:
Acquire a basic knowledge in solid state electronics including diodes, BJT, JFET and MOSFET;
Develop the ability to analyze and design analogue electronic circuits using discrete
Components;
Demonstrate an understanding of the concept of bias and small signal approximation.
Analyse the frequency responses of common amplification circuits.
Develop the ability to identify and classify power amplifiers.

EEC 207: CIRCUIT ANALYSIS 4
Credits (40-20-0)

Objectives: To enable the student to be able to evaluate the responses of various networks and, in increase or decrease in current and voltage
Analyse circuit characteristics using ABCD parameters
Design and analyse filters.

Content:
Transients
Reactive circuit, Two port network, Parameters, Open circuits and loaded two port net works, Solve problems involving two port networks, Image impedance

Passive filters
Low pass, High pass, Band pass, Band stop

Active filters
Graphical method, Lap lace transformation, Transmission line

Outcomes:

EEC 208: PROGRAMMING 1 4
Credits (30-10-20)

Objectives: To teach a major computer programming language that can be used to develop programmes for electrical systems analysis.

Content:
Computer programming in C++

Outcomes:
At the end of the course, the student should be able to apply a programming language such as C++ to the solution of general purpose problems and to the analysis of electrical and other technological systems.

CEC 210: ELECTRO-PHYSICS 4
Credits (40-10-10)

Objectives:The purpose or this course is to enable the student to understand the basic fundamentals in analogue and digital electronics.

Content:
Analogue:
Semi conductor, Semi conductor devices, Field effect transistor, Injunction transistor, Photo electric devices, Feedback amplifier, Oscillators, Multi vibrators

Digital Electronics

Number systems and codes, Binary arithmetic, Logic functions, Simple combinational logic design procedure, Minimization procedures, Bistable elements, Sequential circuits, Differential amplifiers, Operational amplifiers

Noise

Outcomes:
On completion of the course, the students should be able to design basic structures of analogue and digital equipment.

EEC 219: COMPUTER AIDED DESIGN 4
Credits (30-10-20)

Objectives: This course introduces the student to techniques of design using a computer with particular attention to AUTOCAD software.

Content:
Using AUTOCAD for designing electrical networks and diagrams on the one hand and SPICE to design electronics circuitry on the other hand
Computer Hardware and Software for A CAD System
An Introduction to Design Optimization
Formulation of a Design Optimization Problem, Search Schemes of Commonly Used, Optimization Methods, Important Issues in Design Optimization
Interactive Computer Graphical Programming
Introduction and Background Review, Programming in CAD Systems (Menu, Macro and High-level Programming – AutoCAD & Pro/E)
Data Organization in CAD
Data Structure and Database, Graphical Standard and CAD/CAM Data Exchange
Advanced CAD Systems and Their Industrial Applications
CAD/CAM Integration and Concurrent Engineering, Virtual-prototyping in Product Development

Outcomes:
At the end of the course, the student should have acquired the skills to apply computer aided design techniques to a specific engineering task.

EEC 221 ELECTRIC DESIGN AND DRAFTING I 3
Credits (30-20-10)

Objectives: Demonstrate the understanding to design and draft various electrical installations and distribution networks.

Content:
Basic Notions on drafting procedures
Drawing types, Engineering sketches, Mechanical drawings, Electrical drawings, drafting room
Catalogs, drawing production, Introduction to mechanical drawings, Safety in the electrical industry, Engineering materials and tools

Consumer distribution

Introduction to Generation, transmission and distribution

Supply system

Distribution systems

Overhead and underground systems, Structure of the MV/LV distribution substation,

Radial and ring distribution system, Low voltage distribution schemes

Consumer's circuit

Regulations, The poles of consumer unit (single, double and triple), Fuses and spare ways

Single phase lead-in diagram and balancing of phases, Definition of circuits (main circuit, sub circuits and final sub circuits), Drafting of typical internal distribution schemes

Selection of cables and feeders

Design current of various single phase and 3-phase loads

Correction factors and minimum current rating

Rating factors and the maximum permissible voltage drop

Selection of cables for various conditions

Circuit protection

Earth leakage protection and earthing systems

Lightning protection of buildings

Protective devices (Fuses, Thermal relays, Magnetic relays and Circuit breakers)

Control Devices

Contacts and electric arc

Switches (lever switch, push button switch, selector switch, timed switch, impulse switch, sensor or process switches e.g. speed switch, pressure switch, temperature switch, liquid level switch, liquid flow switch)

Electromechanical relays and contactors

Wiring systems

Bare conductor system

Insulated conductor systems (PVC cables, sheathed rubber cables, Mineral insulated metal sheathed cables, armoured cables)

Cables and conduit fixing accessories

Conduit systems, trunking systems and rising mains

Prefabricated wiring layout

Temporary installations

Agricultural and horticultural installations

Electric lamps and Illumination

Light waves and the spectrum, Definitions and Laws of Illumination, Lighting design using Point-to-point method, Electric lamps (Incandescent, Fluorescent, mercury vapour,and sodium vapour lamps), Polar curves of candle power (C.P.) distribution, Globes and reflectors

Flood lighting, lighting design terminology, Design of lighting schemes and layout using the Lumen method

Resources

Distribution board, Lamps, Wiring accessories, Circuit breakers, Transformers, Power supplies

IEE Regulations, IEC references, drawing materials

Computer tools:
ECODIAL, AUTOCAD

Outcomes:
On completion of this course, the student should be able to:
Demonstrate the understanding of electricity supply to various types of consumers.
Know the selection of cables for particular installations and the parameters that affect their selection.
Understand various types of connection diagrams and use them in various design situations.
Understand the basic principles of illumination and the selection of fittings for specific purposes.

EEC 232: ELECTRICAL CIRCUIT THEORY I 3 Credits (40-20-0)

Objectives: To understand and characterize passive electrical components and their impact on transients in electrical system and to study the frequency selective behaviour of specific interconnections of these components.

Content:
Transients
Transient phenomena and decay, transients in inductive and capacitive circuits, equations for currents in an inductive circuits (increasing and decreasing), network problems solution based on increasing and decreasing currents in inductive circuits, currents in an R-L-C circuit, application of currents in R-L-C circuits to solve network problems such as tuned circuits (parallel and series)

Two-port networks
One-port and two-port networks, definition of ABCD parameters, representation of simple transmission networks using ABCD parameters, ABCD parameters in passive networks and the output in terms of input quantities, ABCD parameter determination from open and short circuit tests, ABCD parameters of a symmetrical lattice, ABCD parameters in parallel and in cascade, the loaded two-port network, image impedance, image impedance in terms of Z_{so}, interactive impedance, insertion loss in Decibel and Neper, problem solving using two-port network

Filters
Definition of a filter, typical characteristic curve of a filter (low pass, high pass, band pass, band stop), symmetrical – τ attenuator pad, symmetrical - π attenuator pad, propagation coefficient, prototype τ – section constant – K low pass filter, prototype π section constant – k low pass filter, low-pass filter as a matching device, the constant – κ high pass filter, the M – derived filter, passive devices (low pass, high pass, band pass, band stop), active filters, differentiation between passive and active filters, application of the different filter types, solving problems with filters, design the different filters (low pass, high pass, band pass and band stop)

Graphical methods
Locus and polar diagrams, concept of complex frequency, graphical determination of amplitude and phase response curves, determination of amplitude and phase from pole-zero diagrams, solving problems related to all of the above.

Outcomes:
The students will have acquired the background necessary for the advanced analysis of electric systems.

EEC 234 ELECTRICAL DESIGN AND DRAFTING II 4 Credits (40-10-10)

Objectives: Demonstrate the understanding to design and draft electrical and communication systems, control circuits in buildings and assess external power requirements.

Content:

Design and drafting of LV installations

Symbols and types of diagrams, lighting sub-circuits, Socket outlets and fixed appliances Ladder diagrams, Emergency lighting systems, Electric bells and indicator systems, Security and fire alarm systems, Call systems, Project – design of a dwelling

Wiring or Connection diagrams

Junction box and terminal board connections, Conductor colour abbreviations, Point-to-point connection diagrams, Highway or cable diagrams, Interrupted line connection diagrams (baseline and feed-line diagrams), Lineless or tubular connection diagrams, Interconnection diagrams, Route diagrams

Testing and troubleshooting

Need for testing, Selection of test instruments, Care of instruments, Verification of polarity test, Insulation test, Continuity test, Testing ELCBs, Testing effectiveness of earthing, Troubleshooting –maintenance and repairs, Cable fault location (The Murray loop test)

Industrial motor control circuits

Motor control circuit regulations, Symbols and control equipment, Remote control, emergency stop and interlocking systems, Industrial motor control circuits with, Direct-on-line starters (Star-delta starters, Forward and reverse operation, Primary resistance starters, Autotransformer starters, Rotor resistance starters), Programmable Logic Controllers (PLC)

Estimation of power requirements

Preliminary steps in the design of a LV installation, Estimation of power demand, Estimation of actual maximum KVA demand (Utilization factor, Diversity factor)

Voltage drop and short circuit calculation

Sizing and protection of conductors, Cable ways and cable tray installation, Current rating in terms of conductor size, Calculation of voltage drop, Calculation of short circuit currents

Blueprints

Preliminary design, Regulations and standards, Final design, Contract documents and specifications, Labour costs and estimates, Assessment of plant and transport requirements, Electrical contracting

Planning and managing electrical projects

Jobs for sub-contracting, The bar chart (master chart and sub-contractor charts), Uses of site diary, materials record book and accident book, Functions of site supervisors, The need for safety supervisors

Outcomes:

On completion of this course, the student should be able to:

Design and draft the layout of electrical/communication systems in buildings
Design and draft the layout of fire alarm systems in buildings

Apply connection diagram techniques in designing electrical systems such as point-to-point diagrams, highway diagrams, base-line and feed-line diagrams, lineless diagrams, etc.
Design and draft industrial motor controls
Apply the principles of load estimation for the selection of generators, transformers and switchgears
Design and draft power plant substations up to 11kV
Use blueprints; understand how the final design is arrived at, and the type of information that could be extracted from blueprints
Understand and apply factors needed in planning and managing electrical projects

EEC 236 ELECTRICAL MACHINES I 4 Credits (40-10-10)

Objectives: Demonstrate the understanding of the basic construction and principle of operation of dc machines and transformers. To study the fundamental principles of electrical machines and the characteristics of transformers and dc machines

Content:
Introduction to machine Principles
Electrical machines and daily life, Introduction to electromechanical energy conversion (Conversion process in a machine, Analysis of machine performance, Magnetic field system, Force of alignment, Energy balance), Rotational motion, Newton's laws and power relationships, Magnetic circuits, Energy losses in a ferromagnetic core, Faraday's law – induced emf, Laplace's law – production of induced force on a conductor, The linear dc machine, Power in ac circuits

Transformers
Principle, Prototype ideal transformer (Power in an ideal transformer, Voltage transformation ratio, Impedance transformation, Analysis of circuits containing ideal transformers), Analysis of real transformers (Losses and efficiency, No load condition, Load condition, Equivalent circuit), Transformer tests (No-load test, Load test, Transformer parameters from test results), Voltage regulation, Approximate voltage drop calculation, All day efficiency, Frame size
Physical characteristics (Construction, Three phase type, cooling), Stabilization by tertiary, winding, The per unit system, Transformer taps and voltage regulation, The auto transformer (Construction, Voltage and current relations, The apparent power advantage, Variable auto transformer), 3-phase transformer connections and vector groups, 3-phase transformer- p.u. system, Transformer rating and current inrush

DC Machines
DC machine principles, Structure, Operation, Armature winding, DC Generators (Induced emf and terminal voltage, Methods of excitation, Losses, Power stages and efficiency, Armature reaction and commutation, Characteristics), DC Motors (Principles of operation, Back emf and terminal voltage, Types of dc motors, Shaft torque and armature torque, Power stages and efficiency, Characteristics, Starting, Grading of starting resistanceSpeed control)

Outcomes:
On completion of this course, the student should be able to:
Study the fundamental principles of electro-mechanical energy conversion
Study the theory, operation and characteristics of dc machines and transformers

EEC 304 ELECTRICAL MACHINES III 3 Credits (40-10-10)

Objectives: To study the fundamental principles, characteristics and performance of synchronous machines. Demonstrate the understanding of construction, operation and performance of synchronous generators and synchronous motors.

Content:

Alternators

Basic structure, Operation, Speed and frequency, Equation of induced emf, Alternator on load, Types of rotor construction, Equivalent circuit, Phasor diagram of synchronous generator, Determination of emfs from phasor diagrams, Power and torque, Measuring parameters of synchronous generators (Open circuit test, Short circuit test), Synchronous generator operating alone – terminal characteristics, Voltage regulation, Parallel operation (Need for parallel operation, Conditions for parallel operation, General procedure for paralleling generators, The synchroscope, Speed droop, Reactive power and terminal voltage relation), Operation of generators in parallel with large power systems, Generators in parallel with generators of same size, Effect of flat frequency – power characteristics, Synchronous generator transients, Synchronous generator ratings, Armature windings, Distribution factor (effects of distributing the windings), Pitch factor (effects of chording or making windings short pitched), Effects of harmonics on distribution and pitch factors

Synchronous Motors

Basic principles of operation, Equivalent circuit, Steady state operation, Effects of changes in field current, The motor and power factor correction, Methods of starting, Advantages and disadvantages, Motor on load, Power flow within the motor, Power developed

Outcomes:

On completion of this course, the student should be able to:

Study the fundamental principles of synchronous machines

Study the theory, operation and characteristics of synchronous generators and motors

EEC 307 FUNDAMENTAL OF DIGITAL ELECTRONICS 4 Credits (40-10-10)

Objectives: The objective of Fundamental of Digital Electronics is to make the students understand functioning of a digital circuit. The course contains description of digital components using core structure of digital logic. This includes number system, Logic gates, Boolean algebra, Combinational logic. This Course will enable student to solve various Boolean expressions, to design and implement digital logic circuits

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Content:

Unsigned number systems including decimal, binary, octal, hex and base conversion,
Codes - BCD, Gray, ASCII and parity.
Basic digital logic gates (AND / OR) and truth tables,
Boolean algebra - postulate and theorems, equation reductions and circuit implementations.
DeMorgan's theorems - NAND and NOR gates and implementation.
Sum of Product circuits
Karnaugh map and circuit simplification
Multiplexers, demultiplexers, decoders and other MSI circuits
Basic SR Flip-Flops - NAND & NOR implementations and limitations.
D Latch, Clocked and Edge Triggered D Flip-Flops.
Edge Triggered JK Flip-Flop.

One Shot Multivibrators and 555 type timers.
Ripple Counter.
Sequential Logic - Synchronous Counters, Shift Registers and basic State Machine concepts.
Memory Systems - RAM, ROM, PROM, EPROM etc.
Programmable Logic - an extension of the PROM - PAL, PLA, and other PLD devices
FPGAs

Outcomes:
On completion of the course, Students will:
Be able to represent numerical values in various number systems and perform number conversions between different number systems;
Demonstrate the knowledge of operation of logic gates (AND, OR, NAND, NOR, XOR, XNOR) using IEEE/ANSI standard symbols, Boolean algebra including algebraic manipulation/simplification, and application of DeMorgan's theorems, Karnaugh map reduction method;
Demonstrate the knowledge of operation of basic types of flip-flops, registers, counters, decoders, encoders, multiplexers, and de-multiplexers;
Be able to analyze and design digital combinational circuits including arithmetic circuits (half adder, full adder, and multiplier);
Be able to analyze sequential digital circuits;
Demonstrate knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD, FPGAs, etc.

EEC 308: TESTING AND RELIABILITY 3 Credits (40-20-0)

Objectives: The course is designed to provide the student with fundamental concepts of reliability engineering and testing methods, including topics such as relationships of reliability engineering, reliability prediction, causes and remedies of component failure, principles of maintainability, purpose of specifications, the need for testing, types of tests and purpose for testing.

Content:
Reliability

Reliability in electrical and electronic engineering, definition of terms (reliability, mean time to failure (MTTF), mean time before failure (MTBF), meantime to repair (MTTR), definition of terms (misuse, inherent weakness, sudden failure, gradual failure, partial failure, catastrophic failure, degradation), instantaneous and proportional failure rates, relationship between failure rate and MTBF, reliability equations ($R= e^{-\lambda t}$; $Q = 1 - e^{-\lambda t}$; $R+Q = 1$), the bathtub curve, the characteristic failure modes of the bathtub curve and the probable causes of failure of each of the modes, wear out failure versus time, interpretation of the wear out failure curve using the normal or Gaussian distribution, determination of the of the failure of a unit from the failure rates of its constituent parts.

Reliability prediction

Reliability calculations (multiplication and addition rules, Binomial probability distribution), mathematical expression of reliability and MBTF of series systems, determine the reliability and the MTBF of series and parallel systems, explanation of redundancy, solving problems on active and passive redundancy, applications of active and standby redundancy.

Causes and Remedies of Component Failure

Causes of failure due to environmental factors (temperature, humidity, atmospheric pressure, chemical content and radiation), Causes of component failure due to operating stresses (operating

voltage, current and frequency), Causes of component failure due to mechanical stresses such as shock and vibration as well as friction, methods of dealing with environmental problems, Deration as a factor of operational stresses (Arrhenius law in illustrating duration).

Maintainability

Definition of terms (maintainability, utilization factor, availability, unavailability, reparability), demonstration of the importance of maintainability to reliability, concepts of preventive and corrective maintenance, factors affecting maintainability, improving maintainability, graphical illustration of the relationship between cost and equipment reliability, the concept of error reporting.

Specification of Testing Methods

A specification aims and uses, typical items of information required in listing specifications, examples of specifications for typical measuring equipment.

Testing

Explanation of terms (reliability demonstration test, reliability acceptance test, calibration test, non-destructive testing, testing for packaging and transportation, identification test, preproduction test) and give examples of each, relationship between testing and inspection on the one hand and quality and reliability on the other hand, the reasons for producing prototype items of equipment, reasons for pre-production testing, the approaches needed when testing prototypes and for small and large batch quantities.

Instrumentation, Testing and Maintenance Laboratory

Laboratory experiments designed to develop and improve the student's skills measurement and sensing instrumentation applicable in electrical and electronics engineering. The laboratory course would therefore focus on the core problems of measuring electrical signals, the capacity to test equipment to trouble shoot, and be able to maintain and repair identified defects in electrical equipment.

Outcomes:

By the end of the course, the student should be able to design electrical and communication systems for reliability. In addition, the student should be able to carry out critical tests to assure reliability.

EEC 309 ELECTRICAL MACHINES II 4 Credits (40-10-10)

Objectives: To study the fundamental principles of ac machines and the characteristics and performance of induction motors.Demonstrate the understanding of the basic construction and principle of operation of induction motors.

Fundamentals of ac machines

A simple loop in a uniform magnetic field (Induced voltage, Torque induced in a current carrying loop), The rotating magnetic field, Relationship between electrical efficiency and rotating magnetic field, Magnetomotive force and flux distribution on ac machines, Induced voltage in an ac machine, Induced torque in an ac machine, Winding insulation, Power flow and losses, Voltage regulation and speed regulation

Three-phase Induction Motors

Construction, Operation, Torque (Starting torque, Rotor emf and reactance under running conditions, Torque under running conditions, Conditions for max torque when running, Effects

of changes in applied voltage on torque, Full load torque and max torque, Standstill torque and max torque), Power stages, Induction motor as a generalized transformer, Induction motor equivalent circuits (Rotor equivalent circuit, Complete and approximate equivalent circuits), Maximum power output, Starting, braking and speed control

Outcomes:
On completion of this course, the student should be able to:
Study the fundamental principles of ac machines
Study the theory, operation and characteristics of induction motors

EEC 311: ELECTRICAL POWER SYSTEMS I 3 Credits (40-10-10)

General Objectives: Demonstrate the understanding of the principle of generation of electrical energy, and operation of power station

Content:
Load curves,
Load factor, diversity factor, demand factor, etc, Economic load dispatch, Generation and fuel, Definitions (Load, busbar, fault, earthing), Effects of variable loads on power station, The power grid, Tariffs, Need for Load flow studies, Fault calculations and Stability studies, Load forecasting (Demand), Environmental considerations

Principles of Generation
Energy, Thermal power plants (Diesel, Steam, Gas turbine), Nuclear power plant, Gas power plant, Magneto-hydrodynamic (MHD) generation, Hydro power plant, Solar power plant, Wind power plant, Tidal power plant

Current, voltage and power
Phasors, Power in single phase ac circuits, Complex power,balanced 3-phase systems, Per-unit quantities, Voltage drop calculation, Short circuit calculation

Demand and cost factors
The consumer (customers), Demand and monotone curves, Cost factor, Cash flow and elements of demand

Outcomes:
On completion of this course, the student should be able to understand the principles and methods of generation of electrical energy

EEC 313 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION 3 Credits (30-20-20)

Objectives: To provide adequate knowledge of measurements techniques using electrical and electronic instruments.
Content:
Qualities of measurement
Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration
Primary sensing elements and signal conditioning
Principles, Classification of sensors and transducers – Selection of transducers – Resistive, capacitive& inductive transducers – Piezoelectric, optical and digital transducers – Basic Instrumentation Amplifier, Sample and Hold Circuit, A/D and D/A converters

Electrical measurements and instruments

Principle and types of analog voltmeters, ammeters, multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements –Instrument transformers – Instruments for measurement of frequency and phase.

Measurement of passive elements

Resistance measurement: Conventional methods, Wheatstone bridge, sensitivity of wheatstone bridge – Kelvin's bridges – Kelvin's double bridge method – Measurement of high resistance – megohm bridge method – Inductance measurement: Maxwell's inductance bridge – Maxwell's LC bridge – Hay's bridge – Anderson's bridge – Capacitance measurement: De Sauty's bridge – Schering bridge – Measurement of frequency : Wien's bridge.

Basic measurement methods of non-electrical parameters

Measurement of Pressure: Comparison with known dead weights - Temperature: Thermocouple – pyrometers - Flow: Flow meters – Rotameters – Electromagnetic flow metres – Level: Mechanical, Electrical and optical level indicators - Speed: tachometers – stroboscopic methods, gyroscopes - Acceleration, Humidity: Wet and dry bulb hygrometer – Dunmore and pope cells, conductivity cells.

Outcomes:

On completion of the course, the students will be knowledgeable in analogue and digital measurement instrument systems, error, calibration etc. They will be able to use all analogue and digital techniques to measure voltage, current, energy, power and non-electrical parameters. Additionally, students will have adequate knowledge of comparison methods of measurement.

EEC 316 ELECTRICAL CIRCUIT THEORY II 3 Credits (40-20-0)

Objectives: Demonstrate the understanding of performance of power system transmission lines

Content:

Primary coefficients of a line

Primary coefficients, Presentation of power system lines, the short transmission line, Voltage regulation, Transmission efficiency, medium line, generalized circuit constants

Secondary coefficients of a line

Characteristic impedance, Attenuation coefficient, Phase shift coefficient, Phase velocity of propagation

The long transmission line

Presentation of a long line, Equivalent circuit of a long line, Power flow through a transmission line, Transmission line transients, Interpretation of the long line equation, Attenuation and phase constants (Travelling waves, incident waves and reflected waves), Infinite line, surge impedance, Surge impedance loading, Tuned power lines

Outcomes:

On completion of this course, the student should be able to:

Determine the primary coefficients (resistance, inductance, capacitance and conductance) of a transmission line;

Determine the secondary coefficients (characteristic impedance, attenuation coefficient, phase shift coefficient and velocity of propagation) of transmission lines;

Solve problems on power system lines (short, medium and long lines);

Determine voltage regulation and transmission efficiency of power system lines.

EEC 321 CONTROL ENGINEERING I 4 Credits (40-20-0)

Objectives: In this course students will apply the knowledge gained in basic mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering processes. They will learn the role of a control engineer in multi-disciplinary teams. The course will provide a basic knowledge of control system analysis and design tools, with emphasis on computer aided design.

Content:
Introduction to Control Systems, Differential Equations of Physical Systems, Transfer Functions of Linear systems - Block Diagram Models, Signal Flow Graphs [SFG], State Variables Models - SFG State Models - TF from State Equations, State Transition Matrix, Performance of Feedback Control Systems, Stability of Linear Feedback Systems, Root Locus Technique, Frequency Response Methods, Stability in the Frequency Domain, Design of Feedback Control Systems.

Outcomes:
On completion of the course, the students will:

- Acquire a working knowledge of system science-related mathematics
- Design and conduct experiments; analyze and interpret data
- Design a system, component or process to meet desired needs
- Identify, formulate and solve control engineering problems
- Understand and analyze the impact of control systems on the society
- Acquire skills to carry out search for technical issues
- Use the techniques, skills and modern control engineering tools necessary for engineering practice

EEC 332: ELECTROMAGNETIC FIELD THEORY 3 Credits (40-20-0)

Objectives: To teach the student the fundamental knowledge of electromagnetic fields and their applications to electrical and communication engineering.

The student should acquire the fundamental knowledge of electromagnetic fields and their application to electrical and communication engineering. The objective therefore is to provide the student with the capability to understand: the principles of electrostatics, the principles and applications of static magnetic fields, the principles and applications of Time-Varying electromagnetic fields, principles and application of plane waves.

Electrostatics

Coulomb's law, application of Coulomb's law to determine force on a point charge place in an external field, determine the intensity of an electric field, flux density, the laws of static electric fields (Gauss law, Divergence theorem), application of the above laws to problems involving electric flux density, potential, electric field force and capacitance; expression for the energy stored in an electric field, calculation of the energy stored in an electric field, practical applications of static electrostatic fields such as lightening discharge and corona.

Static magnetic fields

Laws relating to static magnetic fields (Boil Savant Law, Ampere's law, Stoke's theorem, divergence theorem), derive the divergence and Stoke's theorems, application of the laws relating to static magnetic fields to solve practical problems, magnetic flux density and magnetic potential, expression for energy stored in a magnetic field, calculation of energy stored in a magnetic field, practical applications of static magnetic fields

Time Varying Electromagnetic Fields

Stating and explaining Faraday's law, Maxwell's equations in differential and integral forms, application of Faraday's laws and Maxwell equations to solve simple wave equations in free space and in lossless medium, practical applications of all the above.

Plane Waves

Wave propagation (in free space, dielectric, conductors), Ponyting vector, dipole radiation, radiation pressure, applying Poynting's vectors to solving problems on energy and radiation pressure, guided TERM waves, understanding wave phenomena (TEM waves between parallel plane conductors, transverse magnetic waves between parallel conductors, transverse electric waves between parallel conductors), reflection of EM waves, total internal reflection of EM waves, Brewster angle and critical angle, solving problems on reflection and refraction of EM waves

Outcomes:

At the end of the course, the student should be able to design components and systems based on the understanding of electromagnetic fields.

EEC 413 ELECTRIC POWER SYSTEM II 4 Credits (40-10-10)

Objectives: To become familiar with the function of different components used in Transmission and distribution levels of power systems and modelling of these components. Demonstrate the understanding of power system protection schemes and switchgear.

Content:

Structure of electric power system

(Generation, Transmission and distribution)Types of ac and dc distributors, Distributed and concentrated loads, Interconnection, HV DC and EHV AC transmission

Transmission line parameters

Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition, Application of self and mutual GMD, Skin and proximity effects, Interference with communication circuits, Typical configuration of 33kV to 400kV lines

Modelling and Performance of transmission lines

Classification of lines - Short line, Medium line and Long line, Attenuation constant, phase constant and surge impedance, Transmission efficiency and voltage regulation, Real and reactive power flow in lines, Power angle diagram, Surge impedance loading, shunt and series compensation, Ferranti effect and corona loss

Insulators and cables

Insulators (Types, Voltage distribution in strings and grading, Improvement of string efficiency) Underground cables (Grading of cables, Power factor and heating of cables, Capacitance of 3-core belted cable, DC cables)

Mechanical design of line and grounding

Mechanical design of transmission line, Sag and tension calculations for different weather conditions, Methods of grounding, Substation layout

Outcomes:
On completion of this course, the student should be able to:

Develop expressions for computation of fundamental parameters of lines;
Categorise the lines into different classes and develop equivalent circuits for these classes;
Analyse the voltage distribution in insulator strings and cables.

EEC 414 ELECTRIC POWER SYSTEMS III 4 Credits (40-10-10)

Objectives: To study the various faults and protection schemes in power systems.
Demonstrate the understanding of power system protection schemes and switchgear

Content:
Principles and needs for protective schemes

Nature and causes of faults, Fault current calculations using symmetrical components
Protection schemes, CTs and PTs and their applications

Protective relays

Operating principles of relays, Electromagnetic relays, Relay characteristics, the universal relay, over current relays, Directional relays, Distance and differential relays, Negative sequence relays, Static relays, Introduction to numerical relays

Apparatus protection

Transformers, Generators, Motors, Protection of busbars and transmission lines

Theory of circuit interruption

Physics of arc phenomena and arc interruption, Restriking voltage and recovery voltage
Resistance switching, current chopping, Interruption of capacitive current, DC circuit breaking

Circuit breakers

Types of circuit breakers (Air blast, air break, oil, SF_6, Vacuum circuit breakers), Comparison of different circuit breakers

Outcomes:
On completion of this course, the student should be able to:

Discuss the need for the protection and various protection schemes
Study relay characteristics
Study apparatus protection
Understand the methods of circuit breaking, arcing phenomena
Understand the working of different types of circuit breakers

EEC 415 CONTROL ENGINEERING II 4 Credits (40-10-10)

Objectives: The course is meant for the students to understand and be able to represent dynamic response, understand the principles and objectives underlying feedback control, and how these affect the architecture of the control system, understand and be able to apply analysis tools do determine control system performance, design a feedback control system to achieve specified objectives

Content:
System response, Laplace Transforms, Time Response, Stability, Frequency response, Control System Objectives, Potential for Control, Performance, Measures, System type,

Classic PID Control, Proportional, Integral and Differential Elements, Effects on system response, PID tuning rules, Frequency Response Analysis, Bode diagrams, Nyquist diagrams, Stability margins, Design control systems, Design objectives, Compensation techniques, Computer implementation.

Outcomes:
On completion of the course, the students will be able to apply knowledge of mathematics, science and engineering in feedback control, design a system, component or process to meet desired needs, understand and be able to apply analysis tools to determine control system performance, design a feedback control system to achieve specified objectives.

EEC 416 INDUSTRIAL COMPUTING 4 Credits (40-10-10)

Objectives: This course is an introduction to personal computing. Topics include definitions of computer types, hardware and software structure as well as the use of software applications; Microsoft Word, Excel, PowerPoint, and Windows Explorer.

Content:
Programmable Logic Controllers
Flow of information with a focus on the control function of PLCs
Basic functions and Design
Technical documents (Data sheets, Timing, Diagrams)
Operation manuals (Schematics, Ladder diagrams)
System malfunctions in or caused by PLC hardware
Safety rules

Outcomes
Upon successful completion of this course, the student should be competent to perform the following tasks:

Explain the role of programmable logic controllers within a given system or module;
Trace and describe the flow of information in a given electrical system or subsystem with a focus on the control function of PLCs in the system;
Describe the basic functions and design of PLCs;
Read, analyze and utilize the technical documents such as data sheets, timing diagrams, operation manuals, schematics, and ladder diagrams;
Correctly localize, identify and document system malfunctions in or caused by PLC hardware, based upon the technical documentation;
Apply safety rules while working on the system;
Transfer the knowledge learned from one system to another system.

EEC 417: POWER ELECTRONICS 4 Credits (40-10-10)

Objectives:This course gives the student an opportunity to understand different techniques used in electrical conversion by power electronic components. The student should be able to design and convert a given application.

Content:
Classification of static converters, Power devices, AC to DC converters, AC to AC convertersDC to DC converters, Switching power supply, DC to AC inverters

Outcome:
The student will be able to understand and design an electrical power converter for a given application.

EEC 418 POWER SYSTEM LABORATORY 4 Credits (0-0-60)

Objectives: Demonstrate the understanding of installation and maintenance of electrical equipment

Content:
Laying of cables, Installation of lighting circuits, Installation of communication (signaling) systems, Installation of machines 1 (DOL and Y-D starting; forward and reverse), Installation of machines 2 (Auto starter and Rotor R starting; forward and reverse), Installation of machines 3 (Stator R starting and Dynamic and counter current braking), Installation of dc machines (starting, braking and speed control).

Resources:
DC Motors, Induction motors, Transformers, Motor-generator set, Tachometers, Torque meters, Power supplies, Ammeters, Voltmeters, Wattmeter, Electronic project boards, Power electronic components, Power control switches (contactors, auxiliary blocks, delay blocks, thermal relays etc.)

Outcomes:
On completion of this course, the student should be able to:
Understand the installation of various wiring systems (over hear, ducting and trunking)
Understand the installation of lighting and communication (signalling) systems
Understand the installation of electrical machine

EEC 419 ELECTRICAL MACHINES LABORATORY 4 Credits (0-0-60)

Objectives: Demonstrate the understanding of testing and analyzing electrical machine performance

Content:
Measurement of power in a single phase circuit, power in a three phase circuit, Study of a single phase transformer (no load, load and short circuit tests), three phase transformer (no load, load and short circuit tests), alternators (single phase and three phase), three phase cage rotor induction motor (no load, load and blocked rotor test), three phase wound rotor induction motor, three phase synchronous motor, single phase and three phase alternators, D.C. generators (separately excited, series, shunt and compound wound), D.C. motors (separately excited, series, shunt and compound wound), electronic machine control

Resources:
DC Motors, Induction motors, Transformers, Motor-generator set, Tachometers, Torque meters Power supplies, Ammeters, Voltmeters, Wattmeter, Electronic project boards, Power electronic components.

Outcomes:
On completion of this course, the student should be able to:
Test and analyze static machines (transformer) performance;
Test and analyze rotating machines (ac and dc generator and motor) performance.

EEC 420 POWER SYSTEM ANALYSIS 4 Credits (40-20-0)

Objectives: to become familiar with the modelling of various power system components and different methods of analysis for power system planning and operation.Demonstrate the understanding of the features of a power system network.

Content:

Overview of power system analysis
Importance of system planning and operational analysis
Distinguish between steady state, quasi stare and transient analysis
Per phase analysis of symmetrical 3-phase system

Power system representation and equations

Single line diagram, per unit representation (per phase), Bus impedance matrix formation and bus admittance matrix, solving power system node equations

Load (Power) flow analysis

Description of power flow problem, Classification of buses into P-Q buses, P-V buses, and slack bus, Power flow equations and solutions: Development of power flow model in complex variable form, Iterative solution using Gauss-Seidel and Newton-Raphson methods,Flow chart and numerical examples

Fault analysis

Types of faults, Symmetrical short circuits, Calculation of 3-phase balanced fault currents Method of symmetrical components, Fault level in a typical system, Power in symmetrical components, Fault analysis in large networks, Bus impedance (short circuit Matrix) method Neutral grounding, Interference with communication circuits

Stability Limits

Equation of motion of rotating machine, Steady state stability, Transient stability, Use of computers in stability studies, Stability of loads

Outcomes:

On completion of this course, the student should be able to:

Model steady-state operation of large-scale power systems and to solve the power flow problems using efficient numerical methods suitable for computer simulation
To model power systems under abnormal (fault) conditions
To model and analyse the dynamics of power systems for small signal and large signal disturbances and to design the systems for enhancing stability

EEC 422 CONTROL OF ELECTRICAL MACHINES 4 Credits (40-10-10)

Objectives: Demonstrate the understanding of practical methods of starting, braking and speed control of industrial machines

Content:

Control and power circuits, Diagram symbols, Control of a relay, Remote control, Emergency stop, Interlocks

Introduction to power electronics

Power electronic components, Basic rectifier circuits, Pulse circuits, Voltage variation by ac phase control, DC-to-DC power control, Inverters, Cycloconverters, Harmonic problems

3-phase squirrel cage (asynchronous) induction motor controllers

Control and power connections, Control of a relay, Signalling, Protection
Direct-on-line starters, Star-Delta starters, Stator resistance starters, Auto-transformer starters, Medium voltage motor controllers, 2-speed motor controllers, Braking, Solid state induction motor drives

Starting of 3-phase squirrel cage (asynchronous) induction motors: Rotor resistance starters

Drum and DC motor controllers

Drum controllers, DC motor starters,the ward-Leonard system and solid state DC motor speed controllers

Medium voltage motor controllers

Full voltage controllers, reduced voltage controllers

Functional diagrams (GRAFCET)

Elements and types, Logic equations and applications

Input relays and PLCs

Electric sequencers, Pneumatic controllers
Electronic phase modules, Programmable logic controllers PLC

Resources:

DC Motors
Induction motors
Contactors, relays, timers, limit switches, etc
Tachometers, Torque meters
Electronic project boards
Power electronic components
PLC training module
Acting cylinders and valves
Ammeters, voltmeters and wattmeters

Outcomes:
On completion of this course, the student should be able to design machine control systems to suit typical applications

UNDERGRADUATE STUDIES

Department of Electrical and Electronic Engineering

QUALIFICATION OFFERED: BACHELOR OF TECHNOLOGY
B.Tech. in Electrical and Electronic Engineering

OPTION: Telecommunications

DURATION OF STUDIES: 3 Years

OBJECTIVES OF DEGREE PROGRAMME:

The objectives of the B.Tech in Electrical and Electronic Engineering programme with option in telecommunications are:

- To produce graduates who are well-educated in the fundamental concepts of telecommunications and are aware of emerging telecommunications technologies;
- To produce graduates who are capable of continuing their professional development throughout their career by combining theory with its application;
- To build human resource capacity in the telecommunications discipline in both the public and private sectors;
- To produce graduates with good communication skills capable of functioning responsibly in diverse environments and able to work in teams;
- To produce graduates who are innovative and are capable of creating jobs.

SKILLS TO BE ACQUIRED:

At the end of the programme, the following skills should be acquired:

- Ability to understand sophisticated techniques in telecommunication networks and the process of interconnecting different networks and be aware of emerging trends in telecommunications.
- Ability to understand telecommunication technologies and the impact of telecommunications on society.

EMPLOYMENT OPPORTUNITIES

The students will have opportunities in the following areas.
As a technical staff in industries related to telecommunications or computer networks
Be capable of pursuing postgraduate studies in Electrical and Electronic Engineering.
Be capable of creating and managing an enterprise.

ADMISSIONS REQUIREMENTS

In addition to the general university requirements candidates must obtain a minimum of grade D at the Advanced level in Physics and Mathematics. Candidates with a Baccaulaureat in Electrical Technology will also be admitted.

REQUIREMENTS FOR A B.TECH

The following courses below must be successfully completed in order to obtain a B.Tech. Degree in Electrical and Electronic Engineering:

COMMON COURSES

CEC 207 COMPUTER FOR BUSINESS
COT 302 INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
COT 304 LEGAL ASPECTS RELATING TO BUSINESS
COT 305 MATHEMATICS 3
COT 306 INDUSTRIAL EXPERIENCE
COT 307 PRINCIPLES OF MANAGEMENT
COT 401 ENTREPRENEURSHIP
CVE 100 CIVICS AND MORAL EDUCATION
ENG 102 USE OF ENGLISH 2
ENG 101 USE OF ENGLISH 1
EEC 204 MATHEMATICS 2
EEC 206 PHYSICS 2
EEC 208 PROGRAMMING 1
EEC 209 MATHEMATICS 1
EEC 211 PHYSICS 1
EEC 213 MATERIAL SCIENCE
EEC 308 INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
EEC 411 DESIGN PROJECT
EEC 498 BTECH PROJECT
FRE 101 FUNCTIONAL FRENCH 1
FRE 102 FUNCTIONAL FRENCH 2
SPT 100 SPORTS

TELECOMMUNICATIONS COURSES

CEC 210 ELECTRO-PHYSICS
CEC 421 NETWORK MANAGEMENT
EEC 205 ANALOGUE ELECTRONICS 1
EEC 207 CIRCUIT ANALYSIS
EEC 213 MATERIAL SCIENCE
EEC 215 DIGITAL ELECTRONICS 1
EEC 217 SIGNALS AND SYSTEMS
EEC 218 SWITCHING NETWORKS

EEC 220 ANTENNA AND PROPAGATION
EEC 224 MODULATION TECHNIQUES
EEC 301 DIGITAL ELECTRONICS 2
EEC 302 DIGITAL ELECTRONICS LABORATORY
EEC 303 ANALOGUE ELECTRONICS LABORATORY
EEC 305 ACCESS NETWORKS
EEC 310 TELECOMMUNICATIONS
EEC 312 TELECOMMUNICATIONS LABORATORY
EEC 315 POWER SUPPLIES FOR TELECOMMUNICATION SYSTEMS
EEC 317 TRANSMISSION SYSTEMS
EEC 319 RADIO COMMUNICATION
EEC 320 TELEVISION SYSTEMS
EEC 401 INFORMATION THEORY AND CODING
EEC 402 ANALOGUE AND DIGITAL ELECTRONICS
EEC 403 SWITCHING AND AUTOMATA THEORY
EEC 404 SATELLITE TRANSMISSION
EEC 405 WIRELESS COMMUNICATION
EEC 406 COMMUNICATION NETWORKS
EEC 407 MOBILE COMMUNICATION
EEC 408 FIBRE OPTIC COMMUNICATION
EEC 409 MAINTENANCE OF TELECOMMUNICATION EQUIPMENT
EEC 410 DIGITAL SIGNAL PROCESSING
EEC 412 EMERGING TELECOMMUNICATION TECHNOLOGIES

GRADUATION REQUIREMENTS

In order to be awarded the degree of B.Tech. in Electrical and Electronic Engineering a minimum of 180 credits from the list of courses above is required.

STRUCTURE OF PROGRAMME FOR B.Tech IN ELECTRICAL AND ELECTRONIC ENGINEERING WITH OPTION IN TELECOMMUNICATIONS

STRUCTURE OF PROGRAMME FOR B.Tech. IN ELECTRICAL AND ELECTRONIC ENGINEERING WITH OPTION IN TELECOMMUNICATIONS

YEAR: ONE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRERE-QUISITES
	FIRST SEMESTER						
FRE 101	Functional French 1	2	C	20	10	0	
ENG 101	Use of English 1	2	C	20	10	0	
EEC 205	Analogue Electronics 1	3	C	40	10	10	
EEC 207	Circuit Analysis	4	C	40	20	0	
EEC 209	Mathematics 1	3	C	40	20	0	
EEC 211	Physics 1	3	C	40	20	0	
EEC 213	Material Science	3	C	40	20	0	
EEC 215	Digital Electronics 1	3	C	40	10	10	
EEC 217	Signals and Systems	3	C	40	20	0	
CEC 207	Computer For Business	3	C	40	20	0	
TOTAL		30		360	160	20	
	SECOND SEMESTER						
CVE 100	Civics And Moral Education	4	C	40	20	0	
EEC 202	Introduction to Cameroon Government and Politics	2	C	20	10	0	
EEC 204	Mathematics 2	3	C	40	20	0	EEC 209
EEC 206	Physics 2	3	C	40	20	0	EEC 211
EEC 208	Programming 1	4	C	30	10	20	
EEC 224	Modulation Techniques	4	C	40	20	0	
EEC 218	Switching Networks	4	C	40	20	0	
EEC 220	Antennas and Propagation	4	C	40	20	0	
CEC 210	Electro-Physics	3	C	40	10	10	
TOTAL		30		330	150	30	

YEAR. TWO

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	PRE-REQUISITES
	FIRST SEMESTER						
COT 305	Mathematics 3	3	C	40	20	0	EEC 204
FRE 102	Functional French 2	2	C	20	10	0	FRE 101
ENG 102	Use of English 2	2	C	20	10	0	ENG 101
COT 307	Principles of Management	2	C	20	10	0	
EEC 301	Digital Electronics 2	3	C	40	10	10	EEC 215
EEC 303	Analogue Electronics Laboratory	3	C	0	0	60	
EEC 305	Access Networks	3	C	40	20	0	
EEC 315	Power Supplies for Telecommunications	3	C	40	20	0	
EEC 317	Transmission Systems	4	C	40	20	0	
EEC 319	Radio Communication	4	C	40	20	0	
SPT 100	Sports	2	C	20	0	0	
TOTAL		31		320	140	70	
	SECOND SEMESTER						
COT 302	Introduction to Law and Fundamental Rights	2	C	20	10	0	
COT 304	Legal Aspects Relating to Business	2	C	20	10	0	
COT 306	Industrial Experience	10	C	20	0	40	
EEC 302	Digital Electronics Laboratory	4	C	0	0	60	
EEC 310	Telecommunications	4	C	40	20	0	
EEC 312	Telecommunications Laboratory	3	C	0	0	60	
EEC 320	Television Systems	3	C	40	20	0	
TOTAL		28		140	60	160	

YEAR: THREE

COURSE CODE	COURSE TITLE	CREDIT VALUE	STATUS	L	T	P	Prere-quisite
	FIRST SEMESTER						
COT 401	Entrepreneurship	4	C	40	20	0	
EEC 401	Information Theory and Coding	4	C	40	10	0	
EEC 403	Switching and Automata	3	C	40	20	0	
EEC 405	Wireless Communication	4	C	40	20	0	
EEC 407	Mobile Communication	3	C	40	20	0	
EEC 409	Signal Processing	3	C	40	10	0	
CEC 421	Network Management	4	C	40	20	0	
EEC 411	Design Project	6	C	0	0	60	
TOTAL		31		280	120	60	
	SECOND SEMESTER						
EEC 402	Analogue and Digital Electronics	4	C	40	20	0	EEC 224
EEC 404	Satellite Transmission	3	C	40	20	0	
EEC 406	Communication Networks	3	C	40	20	0	
EEC 408	Fibre Optic Communication	4	C	40	20	0	
EEC 410	Maintenance of Telecommunication Equipment	3	C	0	0	60	
EEC 412	Emerging Telecommunication Technologies	3	C	40	20	0	
CEC 498	BTech Project	10	C	0	0	60	
TOTAL		30		200	100	120	

SUMMARY

PARAMETER	NUMBER			
	CREDITS	LECTURE TEACHING HOURS	TUTORIAL TEACHING HOURS	PRACTICAL TRAINING HOURS
Year One	60	690	310	50
Year Two	65	460	200	230
Year Three	61	480	220	180
Sub-Total	186	1630	730	460
TOTAL CREDITS				186
TOTAL CONTACT HOURS				2,820

Course Descriptions

CEC 207: COMPUTER FOR BUSINESS 3 credits (40-20-0)

Objectives:
At the end of the course, the student should be able to:

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

Content:

- Introduction: historical background;
- Types of computers and application areas;
- Impact of computers on society;
- Current notion: e.g. information society and globalisation;
- Outline computer organisation (block structure of computers);
- Explanatory definitions and examples of basic hardware, software and networking;
- Explanatory definitions and procedures in using Computer systems (e.g. business and data processing);
- Internet working: Internet access; of Internet facilities (e.g. E-mail, WEB page access/download, file transfer). Information Services: e. commerce; mention assorted internet related protocols and standards: e.g. http, ftp, html;
- Office automation: Introductory use of word processor, graphics and spread sheet packages, database assess;
- Conceptual (abstract) view/layout of problem handled be given packages, optional, packages: presentation graphics and graphing packages;

Outcomes: At the end of the course, the student should be able to know computer related concepts.

CEC 210: ELECTROPHYSICS 3 credits (40-10-0)

Objectives:
The purpose or this course is to enable the student to understand the basic fundamentals in analogue and digital electronics.

Content:

Analogue:

- Semiconductor
- Semiconductor devices
- Field effect transistor
- Injunction transistor
- Photo electric devices
- Feed back amplifier
- Oscillators

- Multi vibrators

Digital Electronics
- Number systems and codes
- Binary arithmetic
- Logic functions
- Simple combinational logic design procedure
- Minimization procedures
- Bistable elements
- Sequential circuits
- Differential amplifiers
- Operational amplifiers

Noise

Outcomes: By the end of the course the student should know devices and systems in analogue and digital electronics and appropriate uses of analogue and digital electronics in analogue and digital equipment.

FRE 101: FUNCTIONAL FRENCH 1 2 credits (20-10-0)
Objectives: The following objectives shall permeate the First Level French Language Programme of the College of technology.
Listening Skills: Familiarize the students with the sounds of the French Language through exposure to native-speaker audio material etc.
Oral skills : Help the students improve their oral communication skills through guided oral activities ranging from simple questions and answers to oral presentations.
Reading skills : improve student's reading skills through a judicious selection of texts suitable for this purpose.
Functional-communicative language activities which will help the student survive abroad: Finding ones way, apologizing making suggestions, receiving and making phone calls, giving or following directions, asking favours, disagreeing politely etc.
Writing skills : Note-taking techniques, Paragraph writing, Narrating and describing events, letter writing. Dictionary and Reference skills.

A la fin de la formation, l'aprenant doit avoir une bonne connaissance de la langue française pour mieux répondre à l'option politique du bilinguisme national et mieux s'intégrer au contexte socio-professionnel.

Content:
A la fois thématiques et morphosyntaxiques, l'accent sera mis sur :
- La grammaire ;
- Les variétés de français ;
- La communication ;
- La vie de l'entreprise ;
- L'étude et la production de textes.

Supports nécessaires à l'atteinte des objectifs :

- La lettre ;
- Le rapport ;
- Les textes littéraires ;
- Les coupures de journaux ;
- Les documents audio-visuels ;
- Compte rendu écrit ou oral des visites d'ateliers ;
- Textes descriptifs et narratifs ;
- Documents iconiques ;
- Le roman-photo ;
- Les exposés ;
- Les débats, etc…

N.B. : Les textes choisis devront tenir compte des spécialités.

Contenus thématiques	Savoir-faire linguistiques	Objectifs grammaticaux	Types de texte à produire	Supports didactiques
Communication	- Défendre un point de vue - Convaincre - persuader -Exprimer son opinion - Exprimer ses goûts - Donner des informations - Prendre des notes - Utiliser les sources d'informations orales et écrites - Situer dans le temps et dans l'espace. - Etablir une relation de cause et de conséquence. - Emettre des hypothèses.	- Les articulateurs logiques - La concession La négation polémique - Les données chiffrées - Les pronoms personnels - Les temps des verbes - Les indicateurs de chronologie (au début, d'abord, ensuite, puis, enfin, finalement etc…) - Les temps du récit passé composé, présent plus-que-parfait, le futur antérieur, l'imparfait -Antériorité, simultanéité, postérité - La nominalisation - Verbes exprimant une relation de cause/conséquence - L'hypothèse (si + Présent, si+imparfait, si+plus-que-parfait)	- Messages publicitaires - Discours de campagne Interview de personnes célèbres -Résumé de films -La lettre personnelle - La lettre officielle - La demande d'emploi - Le compte-rendu - Le rapport -Biographie - Le fait divers - Le texte informatif - Textes explicatifs - Lettres d'excuse - Rapports policiers	- Débats - Sources audio-visuelles - Les professions de foi - Les textes publicitaires, les manifestations et les tracts - Les tableaux et les chiffres - Tous les types de lettre - La carte de vœux - Curriculum vitae biographie des personnes célèbres, récits autobiographiques, coupures de presse - Faits divers - Textes scientifiques - Enquêtes policières

Discours rapport	- Rapporter les paroles de quelqu'un - Interpréter les paroles de quelqu'un -Identifier les sources d'informations	- Le discours rapporté, - Les verbes introducteurs de discours rapporté - La concordance des temps	- L'interview, le récit - Le dialogue associé au récit - les témoignages - les dépositions	- La conversation téléphonique -Les écrits journalistiques - La bande dessinée - Les documents sonores - Les extraits de film - Le roman photo
La prise de parole	- Prendre la parole - Participer à un débat - Présenter un exposé oral - Organiser un discours - Intervenir en public	- Relier les informations au moyen des pronoms relatifs - La précision du vocabulaire - La cohérence - Les registres de langues	- Exposé oral - Débat	- Sources sonores audio-visuelles - La mimogestualité - débats radiophoniques
La vie associative	- Donner un conseil - Interdire -Passer une consigne	- L'impératif - Le conditionnel - Le futur simple - Le subjonctif	- Les notices - Les modes d'emploi - Les rapports - Les exposés	- Les règlements intérieurs des jeux - Les notices - Les modes d'emploi - Les consignes
La vie socio-professionnelle	- Les formes d'emploi (vocabulaire du monde du travail) - Rédiger un CV - Faire un exposé pour présenter son expérience	- Utilisation des connecteurs - Formuler une définition.	- Les C.V - Demandes d'emploi - Les rapports - Les exposés	-Demande d'emploi - Les C.V - Les profils de postes
La description	- Interroger pour obtenir des informations et des explications - Rédiger un compte-rendu de visite - Décrire des installation - Décrire les mouvements	- Les formes, les couleurs, la mise en relief, les adjectifs pur caractériser	- Textes techniques - Modes d'emploi - Guide de l'utilisateur	- Textes techniques - Modes d'emploi - Guide de l'utilisateur.

Outcomes

At the end of the course, students should be able to interact in all social situations where French is used.

FRE 102: FUNCTIONAL FRENCH 2 2 credits (20-10-0)
Objectives : The Second Level French Language Programme will be skill-focused.

Development of oral, writing, reading and comprehension skills

By the end of the course, the student shall be expected to :
In Oral Comprehension : Follow a lecture or seminar presentation given by a native-French speaker, distinguish between the main topic of discussion and a digression.
In Oral Communication : Attend an interview confidently in French, Have the ability to formulate and ask questions (in the course of a seminar or lecture) in clear and precise French.
In Reading Comprehension : Recognize the topic sentence of paragraph, connectors and their various functions. Develop faster-reading skills as well as Read and interprete technical data and instructions
In Writing (Communication): Demonstrate a knowledge of scientific and technical rhetoric, showing precision and economy as typical in scientific discourse. Describe processes and experiments. Write Reports and Formal Letters etc.

Outcomes
At the end of the course, students should be able to interact in all social situations where French is used.

ENG 101: USE OF ENGLISH 1 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;

Phrase;
Sentence;
Discourse;
- Basic grammatical functions;

Subject;
Objects;
- Grammatical categories;

Gender;
Person;
Number;
Count and non punctuation;
Etc
- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes

At the end of the course, students should be able to interact in all social situations where English is used.

EEC 209: MATHEMATICS I 3 credits (40-20-0)

Objectives:

- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

15.DISCRETE MATHEMATICS

- Logic
- sets, relations and correspondence

16.CALCULUS

A/ Functions of real variable

- Domains and codomains
- Limits and continuities
- Odd and even functions
- Limits at the extremities at the domain of definition
- Derivatives and their applications
- Table of variations and curve tracing
- Rolle's theorem and mean-value theorem of differential calculus.

B/ Trigonometric functions and inverses

- Hyperbolic functions and inverses

C/ Taylor series

- nth degree polynominal approximation of function in the neighbourhood of zero
- regular and complementary parts of a taylor series, taylor series in the neighbourhood of zero of the functions Sinx, Cosx, Tanx, ex, e-x, In(1+x), ArgSinx, ArgCosx, ArgTanx, Coslix, Sunlix, Arcosh, ArgSinx and Argtalix.
- Applications to the study of thee behaviour of functions.

17. SEQUENCES OF REAL NUMBERS

- Definition of a sequence of real numbers
- Convergence of sequences
- Monotonic sequences
- Caudry sequences
- Geometric and arithmetic progression

18. DEFINITION OF A FUNCTION

- Behaviour of a function of a real variable
- Domain of definition
- Limits and even functions
- Domain of study
- Limits at the extremities of the domain of definition
- Derivatives and application
- Table of variation
- Curve tracing
- Rolls theorem
- Mean-value theorem in differential calculs.

19. TRIGONOMETRIE AND INVERSE TRIGONOMETRIC FUNCTION

- Hyperbolic functions and their inverses

20. TAYLOR SERIES

- 4^{th} degree polynomial approximation of function in the neighbourhood of zero
- Regular and complementary terms of a taylor expansions

- Tailors expansion formula for elementary functions in the neighbourhood of zero: Sinx, Cosx, Tanx, expx, exp-x, In(1+x), Arc cosx, Arc sinx, Arctana, Cohx, Sinhx, Arg coshx, Argsinhx, Argtanhx.

Applications in studying the behaviour of functions.

21. GEOMETRY

Conic Sections: circle, ellipse, parabole, hyperbola

- Graphs, Parametric representation
- Tangents and Normals
- Applications.

Outcomes:

At the end of the course, students should be able to understand the concepts of calculus as related to computation.

EEC 205: ANALOGUE ELECTRONICS I 3 credits (40-10-10)

Objectives: This course is designed to give the student advanced knowledge of analogue electronic systems.

Content

Analogue amplifier I

I. DIPT amplifiers C{CE,CB,CC};

- Transistor equivalent in AC
- Equivalent circuit or the amplifiers above
- Explain how they function
- Calculation of voltage gain, current gain, inputs and output impedances,
- Power gain
- Compare the different amplifiers above.

II. FET Amplifiers (CS, CG, CD):

- Transistor equivalent in AC
- Equivalent circuit or the amplifiers above
- Explain how they function
- Calculation of voltage gain, current gain, power gain
- Compare the different amplifiers above.

III. Frequency response of amplifiers:

- Considering coupling + by pass capacitors
- Cut off frequencies
- Bandwidth
- Bipat and FET in HF.

IV. Examples of low frequency amplifiers:

- Power amplifiers
- Different classes of power amplifiers (class A, Ab, B, C) and their characteristics
- Different power, efficiency
- Give example of each class

V. Rectifiers

- Halfwave, fullwave, bridge (single phase and three phase)
- Filtering
- Voltage regulation

Analog amplifier II

I. Differential amplifiers

- Single output, double outputs
- Differential gain, common mode gain (CMRR)
- Different structure of differential amplifier
- Domain of application (Wheatstone bridge, sensors).

II. FEED BACK Amplifiers

- Explain positive and negative feedback phenomena in amplifiers
- Block diagram, Deinue general expression for stage gain of basic feedback amplifier
- $AUF = \frac{AU}{1 + Bav}$
- Types of negative feedback
- Series-current feedback, series voltage feedback (short current, short voltage)
- Effects of negative feedback on (gain, stability, distortion, noise, impedance, bandwidth, gain bandwidth, product)
- Operational amplifier
- Characteristics of ideal operational amplifiers
- Linear application; different voltage, amplifiers (summer, differentiator, integrator, infinite impedance circuit)
- Non linear applications
- Comparator
- Schmitt trigger circuit
- Voltage rectifier
- Multivibrator, monostable (NESSS)

Noise

- Define noise unwanted composite signal
- Different types of noise (EFT, transistor, white noise)
- Sources of noises (light, ignition, switches, electrical generation)
- Characteristic of noise (signal to noise ratio, noise factor, noise temperature)
- Calculate the above characters.

Oscillators

- Principles of oscillation (gain, phase condition)
- RC oscillation (transistor, opamp)
- LC oscillator (colpitt, clamp, harlet);
- Quartz

Practical BIPT

- Amplifier, FET amplifier
- Opamp
- Oscillator
- If possible all the applications in the above studied; circuits

Outcomes: At the end of the course the student should be able to design analogue electronic systems for a given task.

EEC 206: PHYSICS II 3 credits (40-20-0)

Objectives:
Develop the capacity to apply physics principles to electrical engineering problems.

Content:

Electromagnetism :

- Magnetism , Magnetic Field and flux, Magnetic circuits
- Ampere Theorem
- Biot and Savart Law
- Energy and magnetic forces

Waves :

- Free Oscillations
- Progressive waves
- Electromagnetic Waves

Thermal phenomena:

- Heat transmission
- Thermal dissipation of materials

Outcomes:
At the end of the course, students should be capable of applying physics principles in engineering fields.

EEC 207 CIRCUIT ANALYSIS 4 credits (40-20-0)

Objectives:

- To enable the student to be able to evaluate the responses of various linear networks in the time and frequency domains using basic circuit theorems and methods.

Models of circuits, Kirchhoff current and voltage laws, branch and loop relationships, resistive circuits, network theorems, one- and two-port networks, sinusoidal steady state network analysis, power considerations in single and three phase networks, transient analysis of first and second order networks, exponential driving functions in networks, frequency response of networks. circuits laboratory and basic instrumentation.

Outcomes: At the end of the course, the students would be able to determine the response of any linear circuit using basic circuit theorems and mathematics.

EEC 208: PROGRAMMING I 3 credits (30-10-20)

Objectives:
This course uses the programming approach to teach students the principles of software engineering and provides an opportunity for them to learn about object-oriented design.

Content:
- Software development analysis
- Requirement analysis
- Programme Design
- Implementation
- Testing
- Maintenance

Outcomes:
At the end of the course, student should understand the basic structure of an algorithm and basic principles of software engineering.

EEC 211: PHYSICS I 3 credits (40-20-0)

Objectives:
Develop the capacity to apply physics principles to electrical engineering problems.

Content:
Mechanics :
- Mechanics of a single particle
- Solid Mechanics
- Potential and kinetic energy
- Statics
- Dynamics

Electricity :
- Charges and charge density
- Electric current and current density
- Complex and vector representation (Fresnel diagram)
- Electrostatics : Electric field , electric dipoles, Gauss Theorem, Poisson equation, Energy , Electric potential

Outcomes:
At the end of the course, students should develop the capacity to apply physics principles to electrical engineering problems.

CVE 100: CIVICS AND ETHICS 4 credits (20-10-0)

Objectives:
By the end of the course, the student should be able to:

- Identify and respects the rights of other citizens;
- Have a clear knowledge of individual and group rights;
- Develop national consciousness;
- Develop environment consciousness;
- Develop a positive attitude to public property;
- Have a keener conscience of general interest.

Content:

- Definition of: ethics, civics, deontology, human rights;
- Foundations of ethics;
- General and professional;
- Ethics;
- Deontology in education;
- Moral consciousness;
- The Universal declaration of Human Right;
- Protection of environment;
- Professional vocation;
- Good governance in public services;
- Human qualities
- Moral figures through national history and foreign history.

Outcomes:

At the end of the course student should be able to develop national consciousness and have a clear knowledge of individual and group rights.

EEC 213: MATERIAL SCIENCE 4 credits (40-20-0)

Objectives

The purpose of this course is to provide the student with the knowledge of electrical properties of materials and thus selection for engineering uses, with natural and electrical properties of materials.

Content:

- Atomic models
- Einstein’s and atomic models
- Uncertainty and Pauli exclusion principles
- Energy bands

- Structures of solids
- Thermal and optical properties
- Electrical and magnetic properties of material

Outcomes: By the end of the course, the student should understand the importance of materials in electronic compoents and be able to select and characterise materials for the production of components.

EEC 215: DIGITAL ELECTRONICS I 3 credits (40-10-0)

Objectives

The course gives the student an opportunity to understand discrete mathematics and master the basic combinatorial logic tools.

Course Content

6. Logic
7. Sets, relations and correspondence
8. number systems:
   - Natural number systems
   - Whole numbers
   - Integers
   - Rational number system
9. number representations:
   - Decimal representations
   - Binary representations and algorithms
   - Hexagonal representation and algorithms
   - Octal representations
   - Binary arithmetic and algorithms
   - Round off errors
10. Booleen algebra
11. Concepts of logic equations
12. Methods of simplifying logic functions
13. Study of specific logic functions
14. Digital logic: Or gates, Nor gates and gates.
15. memories (ROM, RAM) PLA, FPLA
16. TTL and CMOS technology.

Outcomes: At the end of the course, the student should be able to use logic gates to implement specific functions.

EEC 218: SWITCHING NETWORK 3 credits (40-20-0)

Objectives

The objective of this course is to offer the student basic theoretical knowledge in the domain of switching technologies as used in the telephone network

At the end of this course the student should be able to:

- Understand the operating principles of a switch in a telephone exchange
- Explain the different switching principles used in exchanges
- Understand numbering schemes used worldwide.

CONTENT

- Principles and structure of Telecommunications Networks
- Telephone and structure of Telecommunications Networks
- Telephone networks
- Switching principles
- Single-stage Network
- Link systems
  - Two-stage Network
  - Three-stage Network
  - Four-stage Network
- Grade of service of Link systems
- Data Networks
- ISDN
- Space and time Switching
  - Space Switches
  - Time switches
- Time-division switching networks
  - Basic network
  - Concentrators
  - PABX Switching
- Grades of service of TD Switching networks
- Principles of circuit switched exchanges
  - Circuit switched exchanges
  - Call blocking within a switch matrix
  - Fan in fan out switch architecture
  - Numbering scheme

Outcomes: At the end of the course, the student would understand the evolution and usefulness of switching techniques.

EEC 220: ANTENNAS AND PROPAGATION 4 credits (40-20-0)

Objectives

- The purpose of this course is to enable the student understand the reasons for transmitting radio signal to remote location using the atmosphere as the communication channel.

CONTENT

1. Propagation

Define the term "Electromagnetic wave propagation"
Distinguish between ground and sky wave.
Describe the effects of refraction and reflection in ionospheric longer
Understand the following in relation to electromagnetic wave propagation
1.4.1 Skip distance
1.4.2. Critical frequency.
1.4.3 Maximum usable frequency (M.U.F)
1.4.4. Optimum traffic frequency
Understand the Saching Phenomenon
explain the choice of transmission frequencies in the different frequency band
describe the use of O.H.F band for point-to-point communication.

2. Antenna

Illustrate the principles of wave radiation using the concept of current through a conductor.
Principles of electromagnetic wave polarisation
Define the following terms used in antenna
2.3.1. Polar diagram
2.32. Radiation resistance
2.3.3. Effective aperture
2.3.4. Antenna gain
2.3.5. Effective length
2.3.6 Directive gain
2.3.7. Antenna loses and efficiency
2.3.8. Bandwidth-beamwidth.
Describe isotropic radiation
describe wire radiator in space
Describe the Hertzian dipole
Describe the current and voltage distribution diagram
Calculation of field strength produced in our antenna some distance away.
Explain with the aid of sketches, the radiation Patterns of:
2.9.1 Horizontal dipole
2.9.2. Vertical dipole
2.10. Describe a vertical monopole antenna
2.11.Explain the principles of resonant antenna
2.12.Explain the principles of horizontal and vertical wire in free space
2.13.Explain the principles of non-resonant antennas

2.14.With the aid of diagrams, describe the following:
2.14.1 Rhombic antenna
2.14.2 Log-periodic antenna
2.14.3. Horn-antenna
2.14.4. Half wave antenna
2.14.5. Parabolic dishes
2.14.6. Yogi antenna
2.15.Describe the following:
2.15.1. Characteristic of emitting antenna
2.15.2. Characteristics of receiving antenna
2.15.3. Properties of large surface antenna
2.16.Determine the gains in antenna in 2.14. above
2.16.1. Illustrate the polar diagram

3. Feeder and Wave Guide

State the properties of feeder and the method feeding antenna and know the importance off correct matching.

Standing wave ratio (S.W.R).

Explain the concept of group velocity.

Outcomes: By the end of the course, the student should be able to design basic antenna structure with minimum noise.

EEC 224: MODULATION TECHNIQUES 4 credits (40-2 0-0)

Objectives

To enable the student to understand the various analogue modulation techniques for the transmission of signals in telecommunications.

CONTENT:

2. AMPLITUDE MODULATION
1.1. Explain the term modulation
1.2. Derive the mathematical expression for wave-form
1.3. Use analytical method to the frequency component present in AM
1.4. Sketch the amplitude spectrum diagram representing double side frequency bands
1.5. Derive expression for the AM radiated power
1.6. Sketch the circuit diagram for DSB production
1.7. The need for DBSC and SBB transmission
1.8. Advantages and disadvantages of SBB over DSB, DSBSC and SSBSC.

3. FREQUENCY MODULATION
2.1. Define frequency and phase modulations
2.2. Derive the expression for a frequency modulation waveform.

2.3. Modulation index, radiated power, frequency deviation, frequency swing and deviation ratio.

2.4. Sketch the amplitude spectrum of an FM signal using Bessel function table with a given modulation index.

2.5. Derive the expression for a phase modulated signal and sketch the wave form.

2.6. Relationship between phase and frequency modulation.

2.7. Production of FM signals using a narrator diode.

2.8. Solve problems on frequency and phase modulation

2.9. Comparison of AM and FM

4. DIGITAL MODULATION

3.1. Explain the term digital modulation

3.2 Coding techniques:

- Pulse amplitude modulation
- Pulse position modulation
- Pulse width modulation
- Pulse code modulation
- Frequency shift keying FSK, phase Shift Keying PSK

3.3. Analyse the frequency components of pulse using Fourier series

3.4. Time division multiplexing principles.

3.5. Application of digital modulation.

5. DEMODULATION

4.1. The term "demodulation"

4.2. Action of a Semiconductor diode as a simple detector for analogue and digital modulated systems

4.3. Deduce mathematically that the output of a non-linear device with an AM input contains the information signal and other signal components.

4.4. The square law detector and expression for its output.

4.5. Coherent detection principles for detecting DSBSC signals

4.6. Expressions for the output of a coherent detector using analytical methods

4.7. Operation of a circuit diagram that uses the principles of coherent detection

4.8. Solve problems involving detection of AM signals

Outcomes: The course enables the students to understand the importance of modulation, know the strengths and weaknesses of various modulation systems, and determine appropriate modulation technique for a given transmission problem.

ENG 102: USE OF ENGLISH 2 2 credits (20-10-0)

Objectives:

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

Content:

- Historical and socio-cultural background of English in Cameroon
- Brief introduction to the structure of English;

Phoneme;
Morpheme;
Word;
Phrase;
Sentence;
Discourse;

- Basic grammatical functions;

Subject;
Objects;

- Grammatical categories;

Gender;
Person;
Number;
Count and non punctuation;
Etc

- Spelling and punctuation;
- Word-function;
- Collocations;
- Prepositions;
- Some confusable works;
- Synonyms, antonyms;
- Figures of speech;
- Idiomatic expressions;
- Reported speech;
- Difference between British and American English (pronunciation, grammar and vocabulary);
- Sound of English, Isolation and In connected speech;
- Sentence stress and intonation.

Outcomes
At the end of the course, students should be able to interact in all social situations more especially in Engineering and Technology where English is used.

COT 302: INTRODUCTION TO LAW AND FUNDAMENTAL RIGHTS
2 credits (20 – 10 – 0)
OBJECTIVES:

- To equip the student with the basic legal principles and concepts essential for an understanding of the legal environment in which he functions.
- To create an awareness of basic human rights and how they can be enforced or protected within the professional context.
- To acquaint the student with the basic texts pertinent to environmental protection and sustainable development.

CONTENT:

PART ONE: Introduction to law:

- The definition of Law
- The classification of Law;
- Sources of Law;
- Laws and Enabling Acts (Texts of Application);
- The concept of legal personality;
- Civil Responsibility (i.e Contract, TORT);
- Criminal Responsibility:
- The Courts and their Jurisdictions;
- Labour Law: formation and execution of the labour contract, remuneration, conditions of work, obligations of the employer and employer and employee, Termination of the labour contract.

PART TWO: Fundamental Rights

- The concept of Human Rights: problem of Definition and context;
- Sources of Human Rights;
- Major international Conventions on Human Rights;
- International conventions relating to women, children and the rights of minorities;
- The Role of the Judiciary and the legislature in the protection of Human Rights;
- The Cameroonian National Commission on Human Rights and Liberties;
- The Civil Society, NGO's and the protection of Human Rights,
- Freedom of expression and the Rights to privacy;
- Violation of Human Rights and Remedies;
- Environmental Protection;
- Pollution, Waste disposal and hazardous activities.

Outcomes: At the end of the course, students should understand the basic legal principles and fundamental rights.

COT 304: LEGAL ASPECTS RELATING TO BUSINESS 2 credits (20 – 10 – 0)

OBJECTIVES:

The course should introduce the student to some fundamental with reference to the industrial and technological fields.

CONTENT:

1. Intellectual Property Law
    - World Intellectual Property Organisation (WIPO); Treaties and their implementation;
    - Patent law
    - Design law;
    - Trade and service marks law;
    - Copyright law;
    - Computer and technology law: fundamentals and computer, contracts, computer fraud and tracking;
2. Law of arbitration
    - Notions of arbitration;
    - Other alternative techniques of resolving conflicts: mediation, negotiation, conciliation and reconciliation…
    - Arbitration agreements;
    - Arbitration tribunals;
    - Proceedings;
    - Awards: recognising, enforcing and resisting awards;
    - Applicable laws;
    - Impact of the OHADA Treaty
3. Company Law
    - Formation of companies;
    - Types of companies;
    - Running and management of companies;
    - Insolvency, liquidation and winding up.
4. Taxation Law
    - Fundamental principles of taxation;
    - Fiscal and customs reforms within the CEMAC;
    - Methods of tax imposition on companies;
    - Types of tax regulations.

Outcomes

At the end of the course, students should understand the basic legal principles and concepts essential for an understanding of the legal environment

COT 305: MATHEMATICS III 3 credits (40-20-0)

Objectives:

- Give to students the tools which are useful for the understanding, solving graphical and computational problems resulting from this speciality.
- Emphasis is placed on the applications of these methods in the problems that arise in this field.
- Computer tools should be used as often as necessary and in particular for computational purposes.

Content:

15. LINEAR DIFFERENTIAL EQUATIONS
- Complex numbers, linearization
- 1st order linear differential equations
    - Definition and examples (physics)
    - Solving the associated homogeneous equation
    - Solving the complete linear differential equation of first order.

16. LINEAR DIFFERENCE EQUATIONS OF FIRST AND SECOND ORDER AND METHODS OF SOLUTION

17. SOLVING SYSTEMS OF DIFFERENTIAL EQUATIONS OF THE FORM

$$\frac{Dx}{Dt} = AX + B, X = \begin{bmatrix} x \\ y \end{bmatrix}, A \varepsilon \square \quad 2 \times 2 \ (R)$$

$B \varepsilon \square$ n x 1 ®

18. SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS
- Definition and examples
- Solving the associated homogeneous equation
- Characteristic equations

19. FOURIER SERIES
- Periodic functions
- Definition of the Fourier Series of a 2T-periodic functions and formulas to calculate the coefficients au, an and bn
- Definition of Fourier series of 2T-periodic functions (T>0) and formulas to calculate the Fourier coefficients.
- Applications in signal processing.

20. OPERATIONAL CALCULUS
- Definition of the Laplace transform and examples
- Laplace transform of a translation, of the derivative of a function, Laplace transform of a constant and exponentials
- Inverse Laplace transforms.

Remark: Proofs and knowledge of proofs is not required

21. PROBABILITY AND STATISTICS.

A. PROBABILITY
- Definition of probability and properties;
- Conditional probabilities;
- Baye's theorem;

- Random variables;
- Moments;
- Expectation, variance, standard deviation;
- Chehychev's sky inequality

B. PROBABILITY DISTRIBUTIONS

- Discrete distributions;
- Bernouilli's distributions;
- Binomial distributions;

    - Continuous distributions;
        - Uniform distributions;
        - The Normal distributions;
        - The Poisson distributions.

C. STATISTICS

- Descriptive statistics;
- Graphical representation;
- Central tendency, dispersion (mean, mode, median, variance and standard deviation, deciles and interquatile range);
- Covariance;
- Correlation coefficients and regression;
- Least square methods;
- Estimation of the mean and the standard deviation;
- Confidence intervals;
- Test of hypothesis.

Outcomes:

At the end of the course, students should be able to understand the concepts of statistics and probability as related to computation

COT 306: INDUSTRIAL EXPERIENCE 10 credits (20 – 0 – 40)

Objectives:

This is an essential aspect of the training aimed at giving industrial practical and motor skills to students.

Organisation:

The workshop or industrial experience shall be carried out either within a block period of not less than three months per academic year. Alternatively, where workshop exist in a school, it shall be preferable to have industrial practice of 8 to 10 hours a week.

COT 307: PRINCIPLES OF MANAGEMENT 2 credits (20-10-0)

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

- Plan, organise, co-ordinate or guide the activities and efforts of subordinates in achieving set goals in the most economical and efficient manner possible.
- Understand and apply management theory to the running of any middle size enterprise.
- Overcome the complexities in modern management.

CONTENT:

- Defining management in general terms;
- Development of modern management thought:
  - Behavioural school;
  - Management process school;
  - Quantitative school;
  - Integrated approach;
  - Systems approach;
  - Contingency approach;
- Planning, organizing, motivating, and controlling as applied to the management of a business;
- The functional field of production/operations management;
- Communication in modern management;
- Leadership, problem-solving techniques, coordination, and human relations necessary for successful management;
- Human resource planning;
- The job;
- The staffing process and compensation schemes;
- Decision making in management.

Outcomes:
At the end of the course, students should be able to plan, organise, co-ordinate or guide activities and efforts in achieving set goals.

COT 308: INTRODUCTION TO CAMEROON GOVERNMENT AND POLITICS
2 credits (20-10-0)

Objectives:

- Equip students with the knowledge of political developments in Cameroon and the working of the Cameroon Government;
- Holders of the H.N.D, like all graduates of institutions of Higher learning should know and understand the legal and political environment in which they live and work;
- Holders of the H.N.D should know their rights and responsibilities as Cameroonian citizens.

Content:

- Survey of Cameroon political history.

- Constitutional developments in Cameroon since Re-unification.
- The division of power between the executive, judiciary and legislative
- Cameroon political parties and party politics
- The Government and the civil society.
- Pressure groups in Cameroon.
- Problems of development and nation-building.
- Government budgeting
- Managing the debt crisis.
- The foreign policy of Cameroon.
- Cameroon and her neighbours.
- The politics of trade.

Outcomes:
At the end of the course, students should have knowledge of political developments in Cameroon and the working of the Cameroon Government.

EEC 301: DIGITAL ELECTRONICS II 4 credits (40-10-10)

Objectives
The course gives the student an opportunity to understand and master basic sequential logic tools.

Course Content

- Concept of sequential logic systems and their model of representation
- Synthesis of small size sequential circuits
- Flip-flops: RS, 3K, D, RS
- Synchronous and asynchronous counters.

Outcome: The student should be able to use knowledge of Digital Eectronics I and of this course to design circuits requiring memory, timing, and synchronization to achieve a specific purpose.

EEC 302: DIGITAL ELECTRONICS LABORATORY 4 credits (0-0-60)

Objectives: Enable the student to identify components for a specific laboratory exercise in order to confirm the theoretical knowledge acquired in relevant courses.

Lab.1. Logic Gates : And, Not, Nor…..
Lab.2. Family and Technology of Logic Gates
Lab.3. Combinatory logic circuits

- Multiplexer
- Demultiplexer

- Encoder
- Decoder

Lab.4. Sequential logic circuits
- Flip- Flop (RS, D, T, JK…)
- Register
- Counter(Up and Down)

Lab.5. Introduction to programmable logic (Microprocessor)

Outcomes: At the end of this practical, the student should be able to characterize, synthesize, design and implement an elementary logic system using gates and flip-flop.

EEC 303 ANALOGUE ELECTRONICS LABORATORY
4 credits (0-0-60)
Objectives: The student will be trained on how to use simple measurement apparatus. They will also be acquainted with basic electronic component.
Lab 1: use of measurement apparatus
Lab 2 characteristics of passive components (Resistance, capacitor, inductance)
Lab 3 junction Diodes
- Identification
- Characteristics
- Zener diode

Lab 4 Oscilloscope I
- Oscilloscopes Description

Lab 5 Oscilloscope II
- Utilisation

Lab 6 A.C. Rectification and filtering
Lab 7 Regulated Power Supply

Outcomes: The student should be able to know how to choose, use different instrumentation apparatus and components.

EEC 305: ACCESS NETWORK 3 credits (40-20-0)

OBJECTIVES

- To teach the student on the technology available in providing accessibility to global telecommunication network
- At the end of this course, the student should understand the differences between networks and their capability.

CONTENT

1. Introduction
2. types of networks.
   - Analog network
   - Integrated digital network (IDN)
   - Integrated service digital network (ISDN)
   - Cellular radio
   - Intelligent network
   - Private network
3. Access Methods used in these network
4. Wireless Networking
   - Introduction to wireless networks
   - Differences between wireless networking
   - Development of wireless networks
   - Cordless telephone (DECT-2)
5. traffic Routing in wireless networks
   - Circuit Switching
   - Packet Switching
   - X.25 Protocol
6. Mobile Communication Networks
   - Cellular networks
   - Global system for mobile
   - Communication (G.S.M)

Outcomes: The course enables the student to choose the appropriate connection media for the last mile connection depending on the needs.

EEC 310: TELECOMMUNICATIONS 4 credits (40-20-0)

Objectives

This course is designed to provide an understanding of the evolution of telecommunication technologies, the drivers that shaped this evolution, where the industry is today and where the industry is moving with regard to technology.

CONTENT

THE EVOLUTION OF TELECOMMUNICATION TECHNOLOGIES

1.1. The early days
1.2. Asynchronous

1.3. synchronous
1.4. analogue
  1.4.1 Amplitude Modulation
  1.4.2. Frequency Division Multiplexing
  1.4.3. Modems
  1.4.5. Digital Vs Analogue
1.5. Digital
  1.5.1. PCM Pulse code Modulation
1.6. Fibre
1.7. Time Division Multiplexing
1.8. Synchronous Digital Hierarchy (SDH)
1.9. Networking
1.10. Switching
  1.10.1. The Intelligent Network (In)
  1.10.2. The Integrated Services Digital Networks (ISDN)
1.11. Satellite
  1.11.1. Transmission delay
1.12. Transmission Media and Delivery Techniques
  1.12.1. Copper
  1.12.2. Fibre
  1.12.3. Wave Division Multiplexing
  1.12.4. Passive Optical Networks (PON)
  1.12.5. Radio
  1.12.6. Wireless Local Loop (WLL)
  1.12.7. Mobile Cellular Radio
1.13. Data systems
  1.13.1. Statistical Multiplexing-Packet, France and cellular techniques
  1.13.2. Packet Switching
  1.13.3. Frame Relay
  1.13.4. Cell Relay or ATM
  1.13.5. The Internet
  1.13.6. Intranets and Extranets
1.14. Network Families
  1.14.1 Public Networks
  1.14.2. Private Networks
  1.14.3 Hybrid Networks
  1.14.4. Service Orientated Networks
1.15. Cable Television

Outcomes: At the end of this course, the student should be capable of understanding devices and systems used in modern telecommunication structures.

EEC 312: TELECOMMUNICATIONS LABORATORY 4 credits (0-0-60)

Objectives: At the end of this course, the student will be introduced to practical aspects of the basic telecommunication concepts

Lab.1. Resonance
- Measurement of resonance Frequency
- Bandwidth
- Q Factor
- Selectivity
- Effect of varying parameter

Lab.2. Amplitude Modulation
- Generation of AM waves
- Measurement of Modulation index
- Effect of over modulation and under modulation
- Envelop detection
-

Lab.3. Frequency Modulation (FM)
- Generation of FM wave forms

Lab.4. Filters

Lab.5. Oscillation

Outcomes: This course should enable the student to acquire the skills to measure the signals generated by a basic telecommunication system in order to determine the basic characteristics of a typical modulation scheme.

EEC 315: POWER SUPPLIES FOR TELECOMMUNICATION SYSTEMS
3 credits (40-20-0)
Objectives

At the end of this course students should understand the various power supply systems employed to ensure uninterruptible supply of power to communications equipment.

CONTENT

- Power Converters.
  - a.c to d.c,
  - d.c et a.c
  - d.c to d.c
  - a.c to a.c
- batteries (Secondary Cells)

- Construction,
- Chemical action,
  - Charge,
  - Discharge,
- Capacity,
- Maintenance procedures

- Standby Power Plant
  - Principles of operation,
  - Maintenance procedures (simple)
- Solar Panels
- Wind generators
- Uninterruptible power supply (UPS)
  - Hybrid system
- Specification of power supplies
- Power factor improvement

Outcomes: At the end of the course, the student should know the appropriate power system for a given telecommunication equipment and should be able to maintain the power supply.

EEC 317: TRANSMISSION SYSTEMS 4 credits (40-20-0)

Objectives

To enable the student to be able to understand different transmission media and their uses in telecommunication, especially optical fibre and the radio frequency spectrum.

CONTENT

- Introduction
- Carrier Systems and their bandwidth limitations
- Media for information
  - Radio
  - Cable: audio, carrier, coaxial, submarine
  - Wave guides
  - Optical fibres.
    - Monomode step index Fibre
    - Multimode step index Fibre
    - Multimode graded index Fibre
- Major classes of radio frequency (HF), VHF and UHF Radio links
- Microwave links
  - Principles and structure of microwave links
  - Digital microwave links
  - Analog microwave links
  - Comparison between digital and analog microwave links

Satellite links

- Planning a link
- Equipment on the satellite

- Earth Stations

Troposphere Seatter

Outcomes: At the end of the course, the student should understand the major differences that exist between the different transmission links in a telecommunication network.

EEC 319: RADIO COMMUNICATION 4 credits (40-20-0)

Objectives

The course introduces the student to communication over the electromagnetic spectrum and the propagation of signals in this medium.

CONTENT

- Signals used in radio communication
- Radio signal amplifiers and detectors
- Sound broadcast Receivers
- Stereophonic Receivers
- H.F broadcast receivers, VHF
- Long-distance communication Receiving systems
- Point-to-Point Radio receivers
- Low Noise receivers
- Propagation:
    - Stratosphere
    - Troposphere
    - lonosphere
- Noise in radio paths and its suppression
- Reception of AM signals, phase modulated signals and FM signals
- Television
    - Signals used in broadcasting
    - TV receivers
    - Digital TV
    - Cable TV
    - Direct broadcast satellite (DSB) TV
- Satellite Communication systems
    - Up Link
    - Down
    - Geostationary Satellite
- RF Aerials and Feeder Systems
    - Omnidirectional aerials
    - Single element aerial systems
    - Multi element arrays
    - Coaxial feeders

- World-Wide Radio Systems
  - High-power low frequency radio systems
  - Non-satellite radio relay systems
- Maritime Communication

VHF work-range-frequencies used aerials used.

Outcomes: At the end of this course the student should understand the different ways of transmitting and receiving radio signals using the different radio channels at low loss (low signal-to-noise ratio).

EEC 320: TELEVISION SYSTEMS 3 credits (40-20-0)

Objectives

The purpose of this course is to study the television system as a special branch of telecommunications. Emphasis is placed on current electronic devices used in the design of T.V. systems.

CONTENT

TELEVISION NORMS
1.1. World Television systems and standards
1.2. compatibility and incompatibility between systems
1.3. PAL, SECAM and NTSC Colour systems and subsystems
1.4. The ITU-TV frequency specifications

TELEVISION TRANSMISSION NETWORKS
Simultaneous transmission of sound picture
Bandwidth requirements for sound, picture and colour transmission
The vestigal side-band concept of transmission
inter-provincial transmission of TV signals
International transmission of TV signals via satellites.

PRINCIPLES OF SCANNING, SYNCHRONIZATION AND GENERATION OF VIDEO SIGNALS
3.1. The scanning process
3.2. Blanking and synchronization pulses
3.3. positive and negative video polarity
3.4. sync and video signal separation and their networks
3.5. Equalization pulses.

TELEVISION ANTENNAS, TELEVISION MODULATION SCHEMES AND TURNERS
4.1. AM modulation for picture

4.2. FM modulation for sound
4.3. Digital Modulation for text and data
4.4. Antenna systems for TV transmission and reception
4.5. Structure of the TV turner and associated RF circuits
4.6. TV Detection and demodulation

DEFLECTION SYSTEMS AND HIGH VOLTAGE GENERATION
Horizontal and vertical deflection circuits
The horizontal output network and flyback transformers
High voltage Multipliers
The television picture tube
COLOUR TELEVISION SYSTEMS
Colour bar signals
Chrominance signals and Amplifiers
Sub-carriers and colour difference signals
The colour Matrix.

TELEVISION TROUBLE SHOOTING AND REPAIR
7.1. Algorithm for diagnosis
7.2. Component identification and replacement
7.3. Instrumentation for TV repairs
7.4. Working in the high voltage setting

Outcomes: At the end of the course, the student should be able to understand the complete workings of a T.V. transmitter/receiver system and carry out maintenance and repairs on them.

CEC 421: NETWORK MANAGEMENT 4 credits (40-20-0)

Objectives: An introduction to the basic concepts of network management covering protocols and the etchniques and software for network management

Content
- Structure of computer networks
- Network topologies
- Network protocols
- Network administration

Outcomes: By the end of this course, students should understands network topologies, network architectures, and network administration

EEC 401: Information Theory and Coding 4 credits (40-10-0)

Objectives: The course introduces the basic concepts of information measure and coding and network security, emphasizing block and convolutional codes.

Course description: Introduction to information theory and error correcting codes such as block coding and convolutional coding.

Outcomes: By the end of the course, the student would know how to measure information, the strengths and weaknesses of different coding techniques and the elements of information security.

EEC 402: ANALOG AND DIGITAL COMMUNICATIONS

4 credits (40-20-0)

Objectives: Upon completion of this course students will posses the ability to:

1. Apply Fourier analysis to study analog communications systems.
2. Explain the basic types of digital carrier systems (ASK, FSK, PSK) and evaluate their effective bandwidths.
3. Understand, analyze and develop error correcting codes using the latest techniques in communications.
4. Describe and discuss the emerging digital communications technologies and demonstrate awareness of professional, ethical and social responsibilities.

COURSE DESCRIPTION: Theory and practice of transmission and filtering of analog and digital signals are covered. Fundamental parameters of digital communication systems, various modulation techniques such as Pulse Code Modulation (PCM) and Delta Modulation (DM) and their performance in terms of bandwidth efficiency and signal to noise ratio (SNR), line coding and pulse shaping are analyzed.

Outcomes: Upon completion of this course students will posses the ability to:

Describe and analyze the mathematical techniques of analog modulation and demodulation.
Convert analog signals to digital format using sampling and quantization techniques.
Define and evaluate the performance of digital communications systems.
Describe digital signaling schemes and determine their properties.

Design source coding schemes based on the Huffman/Shannon-Fano and Lempel-Ziv algorithms.
Develop hands-on experience by analyzing, and implementing PCM and DM systems using CAD and hardware experiments.

EEC 403: SWITCHING AND AUTOMATA THEORY 3 credits (40-20-0)

Objectives:
1. Describe the structure of several types of Programmable Logic Devices-.
2. Understand the basics of VHDL and use it in the programming of digital systems .
3. Understand the concepts of State Machine Design and develop Mini-Processors .
4. Understand the electrical characteristics of logic gates, Timing Parameters, and Arithmetic Circuits.

COURSE DESCRIPTION: The course covers synchronous state machines. VHDL techniques are used to cover state transition analysis, synthesis and optimization techniques.VHDL concepts are used to develop simulation wave-shapes of all the circuits involved. The course involved with the study of combinational networks, counters, shift registers and sequential machines.

OUTCOMES: Upon successful completion of this course, students should be able to:
1. Analyze, simplify, and design Combinational Logic Circuits.
2. Use Altera's Quartus II Software to design, simulate, and implement .
3. Analyze and design Combinational Logic Functions such as Decoders, Encoders, Multiplexers, and Comparators .
4. Analyze and design Sequential Logic Circuits such as Latches, Flip-flops, Counters, and shift registers.

EEC 404: SATELLITE TRANSMISSION 3 credits (40-20-0)

Objectives: The course is designed to teach the student the basic concepts and techniques used in satellite communication.

COURSE DESCRIPTION: An overview of the basic concepts and techniques used in satellite communications is introduced. The three major segments of a satellite system: the space segment, the earth segment and the

link between these segments are described. A short introduction to satellite launching, followed by a discussion of the methods of determining antenna look angles. The antenna gain and beam-width equations are examined with emphasis on the parabolic antenna. Uplink and downlink budgets are examined. Carrier to noise ratio, bit energy to noise density ratio and gain to noise temperature ratio are studied. Frequency modulation and multiphase modulation methods are investigated.
The laboratory part of this course uses several software simulation tools to analyze the different segments of the satellite communication networks. The link budget analysis, launching phase analysis and others are performed to improve understanding of the theoretical concepts. Dish antenna, transmitter/receiver, waveguides and spectrum analyzer are utilized to enhance experiments.

Outcomes: Upon the completion of this course students shall be able to:

1. Analyze the earth segment as well as the space segment.
2. Analyze the link budget for a complete satellite system.
3. Analyze the different modes of interference due to other satellite systems or neighboring terrestrial microwave stations.
4. Carry out several satellite simulation software that Includes visualization of the concepts leaned in the lecture part and methods of Link Budget calculations and Interference Analysis between satellite systems and their corresponding earth stations.

EEC 405: WIRELESS COMMUNICATIONS 4 credits (40-20-0)

Objectives: Upon completion of this course students will possess the ability to:

1. Understand key wireless communications terms and concepts.
2. Understand the basic operations of wireless equipment as they relate to the communications industry.
3. Understand the basic principles and practices of installing and maintaining wireless communication equipment and wireless networks.

COURSE DESCRIPTION: The course covers concepts of wireless systems; propagation effects, including loss, dispersion, fading, transmission, and reception; mobile systems, including analysis and design principles of base units and mobile units; micro cells and pico cells; cell division, including frequency use and reuse; concepts of FDMA, TDMA, and CDMA; error rates and outage probability. Computer simulations and hard wired experiments dealing RF spectrum, outdoor and indoor propagation, cellular concept, DSSS, IEEE 802.11 WLAN, and CDMA are parts of laboratory exercises.

Outcomes: Upon completion of this course students will possess the ability to:

1. Characterize the tradeoffs among frequency reuse, signal-to-interference ratio, capacity, and spectral efficiency.
2. Characterize large-scale, small-scale propagation models and their corresponding path losses.
3. Describe different types of diversity and how they improve performance for mobile radio channels.
4. Characterize TDMA, FDMA and CDMA.
5. Study, analyze, and critically evaluate the major product offerings of current vendors, their costs, and applications.

EEC 406: COMMUNICATION NETWORK 3 credits (40-20-0)

Objectives: The course will is designed to enable the student to

1. Understand the reasons why the networking industry uses a layered model; Explain network segmentation using bridges, switches, routers, brouters, and getaways; Explain LAN and WAN standards.
2. Expose students to network topologies, media, standards, Ethernet, switching technologies
3. Learn protocols: ISO and TCP/IP

COURSE DESCRIPTION: The primary objective of this course is to help students to master the Local Area Networks (LANs) and Wide Area Networks (WANs). The proliferation of networks in the workplace and the popularity of the Internet have contributed to an increasing need for networking professionals with both LAN and WAN configuration skills. Employers are looking for qualified people to fill the demand these networking jobs. This course will cover IP addressing, routing, switching, network troubleshooting, and network management skills to interconnect LANs and WANs.

Outcomes: Upon completion of this course, students will possess the ability to:

1. Design a LAN and explain the basis for the choices in the design.
2. Be comfortable with network terminologies and work with network equipment.

EEC 407: MOBILE COMMUNICATIONS 3 credits (40-20-0)

COURSE DESCRIPTION: The course covers the basic concepts of mobile communications technologies, including GSM, CDMA, GPRS, UMTS and evolving technologies.

Objectives: The course aims to introduce the principles of the most important protocols of mobile communications to enable the student to

1. Understand the basic concepts of GSM
2. Understand the basic concepts of CDMA
3. Understand the place of GPRS in mobile communications
4. Understand the use of UMTS
5. Be acquainted with next generation mobile technologies.

Outcomes: At the end of this course students should be able to master the concepts of and distinguish between the different technologies and protocols of mobile communications.

EEC 408: FIBER-OPTIC COMMUNICATIONS 4 credits (40-20-0)

Objectives: Upon the completion of this course, the students should be able to understand the principle of fiber-optic communications.

COURSE DESCRIPTION: This course is devoted to all aspects of fiber-optic communication technologies. Optical fibers, LEDs, laser diodes, photodiodes, passive components, optical amplifiers, and all basic units of a fiber-optic communications system are discussed. Transmission aspects of optical networks are also studied. The laboratory familiarizes students with main components, measuring and troubleshooting tools and techniques for optical communications applications.

Outcomes: By the end of the course, the student would have acquired the skills to

1. Describe the main types of components for fiber-optic communication systems.
2. Describe the main types of architectures, protocols and standards governing modern optical networks.
3. Develop hands-on experience in working with fiber-optic communications equipment.

EEC 410: SIGNAL 3 credits (40-10-0)

Objectives : The course provides the understanding of the functioning and functions of digital filters and signal processors.

Programme :

- Discrete time signal and systems
- Discrete Fourier transform : properties and fast algorithm
- The Z-transform
- Frequency response from s- and z- planes
- FIR and IIR filter design and structure of digital filters
- Digital signal processor
- Basic image processing

Outcomes: The student should be to analyze and design digital filters with specified characteristics.

EEC 411 DESIGN PROJECT 6 credits (0-0-60)

Objectives: This course brings together the student's knowledge to the design and presentation of a working project which solves a basic problem.

EEC 412: EMERGING TECHNOLOGIES OF TELECOMMUNICATIONS
3 credits (40-20-0)

Objectives: The course is designed to expose students to new developments in and applications of communication technologies so that students can explain the main foundations of emerging technologies.

COURSE DESCRIPTION: A senior level course covering current topics and concerns in the telecommunications field. Students conduct research of the current literature on topics and information that are timely and important to the technology.

Outcomes: Upon completion of this course students will be exposed to new developments in and applications of emerging technologies of telecommunications.

EEC 498: BTECH PROJECT 10 credits (0 – 0 – 60)

Objectives: Under the supervision of a lecturer, a project must permit a student to :

- Master how to carry out the scaling of setups which can either be of an elaborated form or are not prototypes or are parts of prototypes and destined to verity a function or a set of electronic function.
- Put in place, exploit and maintain electronic systems

Content:
The problematic of the subjects related to these projects are based on the following themes; however, the list is inexhaustible:

- The function of Analogue Electronics
- The function of digital electronics
- Instrumentation
- Software system design and analysis

- Internet technology
- Computer networks

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Outcome: At the end of the course, the student should be able to master the structure of a scientific write-up.