2022-2023

Communication and Electronics Engineering Program Specification
(فصول دراسية)

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Communication and Electronics Engineering

B.Sc. Program Specification

1.	**Basic Information**		
	1.1	Program title	Communication and Electronics Engineering
	1.2	Program type	Double
	1.3	Department (s)	Communication and Electronics Engineering
	1.4	Coordinator	Dr/Amira Elsonbaty
	1.5	External evaluator(s)	prof.Dr. Osama sayed mohammed
	1.6	Last date of program specifications approval	11/2023
2.	**Professional Information:**		
	2.1	**Program Vision**	
		Achieving leadership in communications and electronics engineering graduates in education, scientific research, and community service locally and regionally	
	2.2	**Program Mission**	
		The Institute's communications and electronics engineering program aims to prepare scientifically qualified and professional engineers in the fields of communications and electronics engineering, they are able to compete locally and regionally,and conduct scientific research ،Solving community problems and developing the environment	
3.	**Program aims**		
The graduates of the communication and electronic program should be able to:			
	1	Master a wide range of engineering knowledge and specialized skills, as well as the ability to apply that information in real-world situations using theories and analytical thinking.	
	2	Apply analytic critical and systemic thinking to discover, analyze, and solve a wide range of engineering problems	
	3	Establish a strong behavior and maintain engineering ethics and standards	
	4	Communicate and work effectively within multiple teams in the field of communications and electronics engineering with a team of professionals in various engineering disciplines, and take responsibility for individual and team performance by developing engineering solutions that affect society, and the environment.	
	5	The contribution of the graduate to the development of engineering and the contribution to the development of the profession and society	
	6	Recognize and respect the importance of the environment and work to promote sustainable principles	
	7	**Use** computer systems, modern engineering techniques, skills, and tools in Electronics and Communication engineering to design a system, component, and process to meet recent technological advances.	
	8	Acknowledge and accept personal responsibility for education, personal development, as well as the ability to achieve post-graduation and research studies.	

	9	Communicate effectively with a wide range of audiences using a variety of communication styles, tools, and languages;
	10	Demonstrate leadership qualities, business management, and skill development.
	11	Allocate projects creatively by analyzing data from intended tests.

4. Graduate Attributes with Program Aims

Graduates Attributes		Program Aims
Attributes of Engineer	1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations. 2. Apply analytic critical and systemic thinking to identify, diagnose, and solve engineering problems with a wide range of complexity and variation.	1) Apply knowledge of mathematics, basic sciences, and engineering principles to solve, analysis, and interpret data related to a wide spectrum of electronics and communications engineering problems.
	3. Behave professionally and adhere to engineering ethics and standards. 5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles	2) Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
	4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance. 10. Demonstrate leadership qualities, business administration and entrepreneurial skill	3) Work in and lead heterogeneous groups of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.

	7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	4) Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
	8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies. 9. Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to contribute to developing, promoting, and facing challenges in the contemporary engineering issues.
	11. Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting.	6) Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting.
	12. Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing. 13. Deal with the computer hardware, software, operating systems and interfacing.	7) Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing and deal with the computer hardware, software, operating systems and interfacing.
	14. Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.	8) Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.
	15. Model, analyze, design and build photonic, microwave components and systems	9) Model, analyze, design and build photonic, microwave components and systems

5. The Academic Reference (NARS 2018) for the Program

5. 1.COMPETENCIES OF ENGINEERING GRADUATE (LEVEL A)

The Engineering Graduate must be able to:

A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
A5	Practice research techniques and methods of investigation as an inherent part of learning.
A6	Plan, supervise, and monitor implementation of engineering projects, taking into consideration other trades requirements.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.
A8	Communicate effectively – graphically, verbally, and in writing – with a range of audiences using contemporary tools.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10	Acquire and apply new knowledge; and practice self, lifelong, and other learning strategies.

5.2. Competencies of Electrical Engineering Graduate (Level B)

In addition to the competencies for all engineering programs the basic Communication and Electronics Engineering graduate and similar programs must be able to:

B1	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission, and distribution of electrical power systems.
B2	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
B3	Design and implement: elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
B4	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.
B5	Adopt suitable national and international standards and codes to: design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.

5.3 Competencies of Electronics and Communications Program Graduate (Level C)

In addition to the competences for all Engineering Programs (A-Level) and the competencies for the Electrical Engineering Discipline (B-Level), the Communications and Electronics Program graduate must be able to (C-Level):

C1	Recognize, explain, analyze, and describe computer elements, computer systems , information technology aspects systems, and Use methodologies of software planning
C2	Understand basic physical phenomena about state-of-the-art components and systems and the limitations of the performance of components and systems in communications and electronics and engineering.
C3	Demonstrate the ability to model and analyze components and systems in communication and Electronics Engineering and identify the software tools to optimize their performance
C4	Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in communication and electronics engineering.
C5	Implement, design, develop, test and compare alternative components and systems, debug, operate and maintain digital systems and services such as computer systems, circuit boards, software systems and embedded systems and demonstrate additional capabilities in communications and electronics engineering.

6. Academic standards

Academic reference standards of communications and electronics engineering program (ARS) which is approved by the national authority for quality assurance and accreditation of education NAQAAE.

7. Reference standards

External references for standards (Benchmarks)

National Academic standards of General Engineering, which were issued by the national authority for Quality Assurance and Accreditation of Education NAQAAE.

Faculty of Engineering - Mansoura University.

8. Program Curriculum Structure and Contents

8.1 Program duration:

The program duration is five years

8.2 Program structure:

Total contact hours of the program: 264 hours

Theoretical:136 hours

Practical/Exercises: 128 hours

Compulsory:244

Elective: 20

From the previous tables, the reference frames determinations can be summarized as follows:

No.	Department	Contact Hours	The program percentage%	Reference Frames' percentage %
A	Humanities and Social	24	9.09	8-12
B	Business Administration	7	2.65	2-4
C	Mathematics and Basic	56	21.21	18-22
D	Engineering Culture	14	5.30	4-6
E	Basic Engineering Sciences	74	28.03	25-30
F	Applied Engineering and	78	29.54	25-30
G	Projects and Practice	11	4.17	4-6
Total		264		

8.3 Program courses

Humanities and Social Sciences		
Code	**Course name**	**Contact hour**
BAS025	Introduction to Engineering and environment	2
BAS026	Technical English Language 1	4
BAS027	Human rights	2
BAS114	Technical English Language 2	4
BAS122	Technical report writing	4
BAS421	Research and Analytic skills	2
CEE413	Communications networks	4
Total	**8.33%**	**22**

Mathematics and Basic Science		
Code	**Course name**	**Contact hour**
BAS011	Mathematics 1	4
BAS012	Mechanics 1	4
BAS013	Physics 1	6
BAS014	General Chemistry	4
BAS016	Introduction to computer systems	4
BAS021	Mathematics 2	4
BAS022	Mechanics 2	4
BAS023	Physics 2	6
BAS211	Engineering Probability and Statistics	4
BAS221	Numerical Methods in Engineering	4
CEE223	Automatic control	5
Total	**21.6%**	**57**

Business Administration		
Code	**Course name**	**Contact hour**
BAS213	Engineering Economy	3
BAS223	Engineering Management	3
BAS321	Project Management and Control	4
Total	**3.79%**	**10**

Engineering Culture		
Code	**Course name**	**Contact hour**
BAS024	Production engineering	5
BAS112	Electrical Engineering Fundamentals	5
BAS311	Environmental management	3
Total	**4.92%**	**13**

Basic Engineering Science		
Code	**Course name**	**Contact hour**
BAS015	Engineering drawing and projection	5
BAS115	Computer programming	4
BAS113	Engineering Thermodynamics	5
BAS123	Introduction to Information Technology	4
BAS212	Fluid Mechanics	4
BAS214	Advanced Computer programming	4
BAS214	Computer organization	4
CEE 313	Integrated circuits	5
CEE111	Electronics 1	5
CEE121	Electronic tests 1	4
CEE122	Electronics 2	5
CEE123	Electronics and electrical measurements	5
CEE211	Fundamentals of Electromagnetism	4
CEE212	Logical and digital circuits	4
CEE221	lectronics circuits 1	4
CEE312	Electronics circuits 2	4
CEE314	Electronic tests 3	5
Total	28.41%	**75**

Applied engineering and design		
Code	**Course name**	**Contact hour**
CEE315	Elective 1	4
CEE325	Elective 2	4
EE311	Signal analysis	5
CEE415	Elective 3	4
CEE321	Optical semiconductors	5
CEE322	Microprocessor systems	5
CEE323	Electromagnetic waves	5
CEE324	Electronic tests 4	4
CEE416	Elective 4	4
CEE412	Communication systems	5
CEE421	Luminous Communications	4
CEE423	Digital communication	4
CEE422	Electronic tests 5	5
CEE414	Antennas and wave propagation	4
CEE411	Digital signal processing	4
EE222	Electronic tests 2	5
Total	28.41%	75

Project and practice		
Code	**Course name**	**Contact hour**
CEE224	Practical Training 1	-
CEE326	Practical Training 2	-
CEE416	Project 1*	5
CEE426	Project 2*	6
Total	**4.16%**	**11**

Contact Hours According to the Requirements

A. University Requirements

Code	Course name	Contact hour
BAS016	Int. to Computer Systems	4
BAS025	Int. to Engineering and Environment	2
BAS026	Technical English Language 1	4
BAS027	Human Rights	2
BAS114	Technical English Language 2	4
BAS421	Research and Analytical Skills	2
CIE421	Legislation and contracts	3
Total		21

B. Institute Requirements

Code	Course name	Contact hour
BAS011	Mathematics 1	4
BAS012	Mechanics 1	4
BAS013	Physics 1	6
BAS014	Engineering Chemistry	4
BAS015	Engineering Drawing and Projection	5
BAS021	Mathematics 2	4
BAS022	Mechanics 2	4
BAS023	Physics 2	6
BAS024	Production Engineering	5
BAS111	Mathematics 3	4
BAS112	Electrical Engineering Fundamentals	5
BAS113	Engineering Thermodynamics	5
BAS121	Mathematics 4	4
BAS122	Technical Report Writing	4

BAS123	Int.to Information Technology	4
BAS211	Engineering Probability and Statistics	4
BAS221	Numerical Methods in Engineering	4
Total		76

C. General Department Requirements

Code	Course name	Contact hour
BAS115	Computer programming	4
BAS212	Fluid Mechanics	4
BAS213	Engineering Economy	3
BAS214	Advanced Computer programming	4
BAS222	Computer organization	4
BAS223	Engineering Management	3
BAS311	Environmental management	3
CEE 313	Integrated circuits	5
CEE111	Electronics 1	5
CEE121	Electronic tests 1	4
CEE122	Electronics 2	5
CEE123	Electronics and electrical measurements	5
CEE211	Fundamentals of Electromagnetism	4
CEE212	Logical and digital circuits	4
CEE221	Electronics circuits 1	4
CEE222	Electronic tests 2	5
CEE223	Automatic control	5
CEE311	Signal analysis	5
CEE312	Electronics circuits 2	4
CEE322	Microprocessor systems	5
CEE411	Digital signal processing	4
Total		89

D. Specific Department Requirement

Code	Course name	Contact hour
CEE315	Elective 1	4
CEE224	Practical Training 1	-
CEE325	Elective 2	4
CEE314	Electronic tests 3	5
CEE415	Elective 3	4
CEE323	Electromagnetic waves	5
CEE324	Electronic tests 4	4

CEE424	Elective 4	4
CEE326	Practical Training 2	-
CEE412	Communication systems	5
CEE321	Optical semiconductors	5
CEE413	Communications networks	4
CEE416	Project 1	5
CEE425	Elective 5	4
CEE423	Digital communication	4
CEE421	Luminous Communications	4
CEE422	Electronic tests 5	5
CEE414	Antennas and wave propagation	4
CEE426	Project 2	6
Total		89

From the previous tables, the contact hours can be summarized as follow:

The Requirements	**Contact Hours**	**The program percentage%**	**Reference Frames' percentage %**
University Requirements	22	8.365	8 -10
Institute Requirements	76	28.897	22 -30
General Department Requirements	94	33.84	30 - 35
Specific Department Requirements	76	28.897	20 -30
Total	263	100	

9. Curriculum Structure and Contents

Level	Semester	Code	Course Name	Pre-	Hours per week			Competencies
					Lect.	Lab	Exer.	
LEVEL 0	SEMESTER 1	BAS011	Mathematics 1	-	2	-	2	**A1**
		BAS012	Mechanics 1	-	2	-	2	**A1**
		BAS013	Physics 1	-	2	2	2	**A1**
		BAS014	General Chemistry		2	2	-	**A1, A10**
		BAS015	Engineering drawing and projection	-	1	2	2	**A1**
		BAS016	Int. to computer systems	-	2	2	-	**A1 A5**
		Total			**11**	**8**	**8**	
	SEMESTER 2	BAS021	Mathematics 2	-	2	-	2	**A1**
		BAS022	Mechanics 2	-	2	-	2	**A1**
		BAS023	Physics 2	-	2	2	2	**A1**
		BAS024	Production engineering	-	3	2	-	**A1 A3 A6**
		BAS025	Int. to Engineering and environment	-	2	-	-	**A1 A3**
		BAS026	Technical English Language 1	-	2	2	-	**A8**
		BAS027	Human Rights	-	-	-	-	**A8**
		Total			**15**	**6**	**6**	
LEVEL 1	SEMESTER 1	BAS111	Mathematics 3	BAS011	2	-	2	**A1**
		BAS112	Electrical Engineering Fundamentals	-	3	-	2	**A1 A2 B1**
		BAS11	Engineering	BAS022	3	-	2	**A1**

		3	Thermodynamics					
		BAS114	Technical English Language 2	-	2	2	-	**A8, A10**
		BAS115	Computer programming	-	2	2	-	**A1 A2**
		CEE 111	Electronics 1	-	3	-	2	**B2, C2**
		Total			**15**	**4**	**8**	
	SEMESTER 2	BAS121	Mathematics 4	BAS011	2	-	2	**A1**
		BAS122	Technical report writing	-	2	2	-	**A5 A8**
		BAS123	Int. to Information Technology	-	2	-	2	**A4 A8**
		CEE 121	Electronic tests 1	CEE 111	2	2	-	**B2 B4**
		CEE 122	Electronics 2	CEE 111	3	-	2	**B2 C2**
		CEE 123	Electronics and electrical measurements	-	3	-	2	**A2 A4 A7 A8 B2 B3 B4 C1**
		Total			**14**	**4**	**8**	
LEVEL 2	**SEMESTER 1**	BAS211	Engineering Probability and Statistics	BAS021	2	-	2	**A1**
		BAS212	Fluid Mechanics	BAS022	2	1	1	**A1 A2**
		BAS213	Engineering Economy	-	2	-	1	**A3 A4**
		BAS214	Advanced Computer programming	-	2	2	-	**A3 B1 C2 C1**
		CEE211	Fundamentals of Electromagnetism	-	2	-	2	**C1**
		CEE 212	Logical and digital circuits	CEE 122	2	-	2	**A3 A9**

								C1 **C2**
		Total			**12**	**3**	**8**	
	SEMESTER 2	BAS221	Numerical Methods in Engineering	BAS115-BAS021	2	-	2	**A1**
		BAS222	Computer organization	-	2	-	2	**B1** **C2**
		BAS223	Engineering Management	-	2	-	1	**A4** **A6** **A8**
		CEE 221	Electronics circuits 1	CEE 111	2	-	2	**B3** **C3** **C5**
		CEE 222	Electronic tests 2	CEE 121	2	3	-	**B2** **B4**
		CEE223	Automatic control	-	3	-	2	**A2** **B1** **B2** **C1** **C2**
		CEE224	Practical Training1*	-	-	-	-	**A5** **A7** **C2** **C3** **C5**
		Total			**13**	**3**	**10**	
	SEMESTER 1	BAS311	Environmental management	-	2	-	1	**A4** **A6** **A8**
LEVEL 3		CEE311	Signal analysis	-	3	-	2	**C1** **C3**
		CEE 312	Electronic circuits 2	CEE 221	3	-	2	**B3** **C3** **C5**
		CEE 313	Integrated circuits	CEE 221	3	-	2	**A3** **B2** **C1**
		CEE 314	Electronic tests 3	CEE 222	2	3	-	**B4** **C4**
		CEE 315	Elective Course 1		2	-	2	**Refer to list of elective**

		Total			**14**	**3**	**9**	
	SEMESTER 2	BAS321	Project Management and Control	-	2	-	2	**A3 A4 A10**
		CEE321	Optical semiconductors	CEE 123	3	-	2	**C1 C3**
		CEE 322	Microprocessor systems	CEE 123	3	-	2	**A1 B2 C2 C3 C5**
		CEE 323	Electromagnetic waves	CEE211	3	-	2	**C1**
		CEE 324	Electronic tests 4	CEE 312	1	3	-	**B4 C4**
		CEE 325	Elective Course 2		2	-	2	**Refer to list of elective**
		CEE226	Practical Training2*	-	-	-	-	**A5 A7 C2 C3 C5**
		Total			**14**	**3**	**10**	
LEVEL 4	**SEMESTER 1**	CEE 411	Digital signal processing	CEE311	2	-	2	**C1 C4**
		CEE 412	Communication systems	CEE 312	2	-	3	**C1 C3**
		CEE 413	Communications networks	CEE 312	2	-	2	**A7 B3 C2**
		CEE 414	Antenna and wave propagation	CEE211-CEE 323	2	-	2	**C5,B3**
		CEE 415	Elective Course 3	-	2	-	2	**Refer to list of elective**
		CEE 416	Project 1*	Completion of 144 CR	3	2	-	**C4 C5**
		Total			**13**	**2**	**10**	
	SEMESTER 2	BAS	Research and	-	2	-	-	

		421	Analytic skills					
		CEE 421	Luminous Communications	CEE 312	2	-	2	**C5**
		CEE 422	Electronic tests 5	CEE 313	2	3	-	**B4 C4**
		CEE 423	Digital Communications	CEE 312	2	-	2	**C1 C3**
		CEE 424	Elective Course 4		2	-	2	**Refer to list of elective**
		CEE 425	Elective Course 5		2	-	2	**Refer to list of elective**
		CEE 426	Project 2*	CEE 416	2	4	-	**C4 C5**
		Total			**12**	**7**	**8**	

❖ Continuous courses; one oral examination for both CEE416 and CEE426 at the end of the second term.

Elective Courses

The students should choose one course from each of the following tables:

	Code	**Course Name**	**Pre-**	**Hours per week**			**Competencies**
				Lect.	**Lab**	**Exer.**	
Elective 1	CEE315A	Electronic design with aids of computer	CEE 122	2	-	2	**B1 C1 C2 C3**
	CEE315B	Telecommunications	CEE311	2	-	2	**B1 C1 C2 C3**
	CEE315C	Computer Circuits Design	CEE 312	2	-	2	**B1 C1 C2 C3**

	Code	**Course Name**	**Pre-**	**Hours per week**			**Competencies**
				Lect.	**Lab**	**Exer.**	
Elective 2	CEE325A	Printed circuit design and fabrication	CEE 322	2	-	2	**B3 C5**
	CEE325B	Mobile communications systems	CEE315B	2	-	2	**B3 C5**
	CEE325C	Wireless Communications	CEE315B	2	-	2	**B3 C5**

	Code	**Course Name**	**Pre-**	**Hours per week**	**Competencies**

				Lect.	Lab	Exer.	
Elective 3	CEE415A	Artificial intelligence	ENG 223	2	-	2	B2 C1 C3 C4
	CEE415B	Advanced electronics measurements	CEE 123	2	-	2	B2 C1 C3 C4
	CEE415C	Special topics in communication engineering	DEPT	2	-	2	B2 C1 C3 C4

	Code	Course Name	Pre-	Hours per week			Competencies
				Lect.	Lab	Exer	
Elective 4	CEE424A	Radar Systems	CEE315B	2	-	2	B3 C5
	CEE424B	Satellite systems	CEE315B	2	-	2	B3 C5
	CEE424C	Computer engineering	BAS016	2	-	2	B3 C5
	CEE424D	Neural networks	ENG 223	2	-	2	B3 C5

	Code	Course Name	Pre-	Hours per week			Competencies
				Lect.	Lab	Exer.	
Elective 5	CEE425A	Robotics And Automation	BAS121	2	-	2	B2 B4 C1 C2 C3 C5
	CEE425B	Fundamentals of biomedical engineering	CEE 221- CEE311	2	-	2	B2 B4 C1 C2 C3 C5
	CEE425C	Industrial Electronics	CEE 122	2	-	2	B2 B4 C1

	Code	Course Name	Pre-	Hours per week			Competencies
				Lect.	Lab	Exer.	
							C2 **C3** **C5**
	CEE425D	Introduction to VLSI design	CEE 312	2	-	2	**B2** **B4** **C1** **C2** **C3** **C5**
	CEE425E	Microwave electronics	CEE 312	2	-	2	**B2** **B4** **C1** **C2** **C3** **C5**

10. Teaching and learning methods	
10.1.Teaching and learning methods	
1	Face-to-Face Lecture
2	Online Lecture
3	Flipped Classroom
4	Presentation and movies
5	Discussion
6	Problem solving
7	Brain storming
8	Projects
9	Site visits
10	Self-learning and Research
11	Cooperative
12	Discovering
13	Modeling
14	Lab
10.2. Teaching and Learning Methods of Disable Students:	
1	Additional Tutorials
2	Online lectures and assignments
10.3 Teaching and learning method for low capacity and outstanding Student	
For low capacity students	-Assign a portion of the office hours for those students. -Give them specific tasks. -Repeat the explanation of some of the material and tutorials. - Assign a teaching assistance to follow up the performance of these group of students
For outstanding Students	-Hand out project assignments to those students. -Give them some research topics to be searched using the internet and conduct presentation. Encourage them to take parts in the running research projects.

11. Methods and rules for student evaluation	
1	Mid Term Examination (written/ online)
2	Formative (quizzes- online quizzes- presentation – reports-……)
3	Oral Examination
4	Practical Examination
5	Project applied on a practical field problem
6	Final Term Examination (written)

12. Program Evaluation		
Evaluator	**Tools**	**Sample evidence**
1-Senior students	Meeting + questionnaire	15% of the students

2- Alumni	Questionnaires	
3- Stakeholders	Questionnaires + Site visits	Samples representative from all sectors
4- external evaluator	Evaluation reports	

12. Communication and Electronics Engineering Courses

LEVEL0-SEMESTER1						
BAS011	**Mathematics 1**					**(4 Contact)**
Content	**Algebra**: vectors algebra- partial fractions – equations theory – vectors – mathematical deduction – numerical solutions methods (simple repetitive method – Newton and modified Newton's method – intersection method – False position method – arrays – linear equations systems – Gauss Jordan method for deletion. **Derivation**: function (definition – theories) – basic trigonometric functions and its inverse – exponential and logarithmic functions – hyperbolic functions and its inverse – connection (definition – theories)- limits (definition – theories) - derivatives (definition – theories – higher order types) – curves drawing – mathematical and engineering derivative applications - undefined formulas - Taylor expansion – Maclaren expansion – approximation – introduction in partial derivation.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**		2 hours /week.
BAS012	**Mechanics 1**					**(4 Contact)**
Content	Applications of space vectors – results of group of Forces - momentums - equivalent couples – equivalent groups - equations of equilibrium for rigid bodies - Supports and pivots types - equilibrium under the effect of forces and the space couples - center of mass (groups of particles - flat surfaces) – moment of inertia (mean axes- equal surfaces).					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**		2 hours/week.
BAS013	**Physics 1**					**(6 Contact)**
Content	Material properties – Physical quantities – Standard units and dimensions – frequency motion, mechanical properties for materials –fluid properties – viscosity – surface tension–sound waves – waves in elastic media - Heat and thermodynamics: heat transfer – Gas motion theory – First law of thermodynamics – entropy and second law of thermodynamics – temperature measurements and thermometers.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**		2 hours / week
BAS014	**Engineering Chemistry**					**(4 Contact)**
Content	Gaseous status - substantial and heat balance in fuel burning operations and chemical operations - properties of solutions - dynamic balance in physical and chemical operations - kinetic chemical interactions - electric chemistry - introduction to chemical corrosion - water processing - building materials - pollution and its treatment.Selected chemical industries: chemical manures - dyes					

	- polymers - sugar - petrochemicals - semiconductors - oil, greases and industrial detergents.					
Lecture	2 hours / week	**Laboratory**	2 hours / week	**Tutorial**		
BAS015	**Engineering drawing and projection**					**(5 Contact)**
Content	Techniques and skills of engineering drawing – engineering operations – orthogonal projection – secondary orthogonal – solid bodies – intersections (cutters for solid bodies – intersections of surfaces) - personals – projections of simple bodies – rules of writing dimensions – drawing of perspectives – deduction of missing projections – drawing of engineering sections. **Drawing of the steel frames** - binding and fixing devices - the assembled drawing for some mechanical steel components Introduction to AutoCAD Fundamentals of engineering drafting by way of computer aided drawing (CAD) software. Basic features and capabilities of CAD software and drafting fundamentals including orthographic projection, and isometric pictorials, part dimensioning in 2 dimensional drawings.					
Lecture	1 hours / week	**Laboratory**	2hours / week.	**Tutorial**	2hours / week -	
BAS016	**Introductions to Computer Systems**					**(4 Contact)**
Content	Computer architecture – computer systems – files systems – computer networks – internet networks – Database systems and information technology – Computer graphics – multimedia systems – methods of solving problems – logical design for the programs and matrices – applications in programming using one structured or visual languages – using this language in solving the engineering problems.					
Lecture	2 hours / week	**Laboratory**	2hours / week.	**Tutorial**	-	
LEVEL0-SEMESTER2						
BAS021	**Mathematics 2**					**(4 Contact)**
Content	**Analytical geometry:** equations of second degree and double equation for two straight lines – movement and rotation of axes – groups of unified axes circles – conical sectors (properties of conical sectors - parabola – ellipse – hyperbola) – analytical geometry in space – Cartesian coordinates – cylindrical – spherical – plane in space – equations of surfaces in second order – rotation and movement of axes in space **Integration:** indefinite integration (basic functions – theories) – method of integration (direct – indirect) - definite integration (definition – properties - theories) – applications of definite integration (plain areas – circular volumes – plain technical length) – areas – circular surfaces – numerical integration.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours /week.	
BAS022	**Mechanics 2**					**(4 Contact)**
Content	Position, displacement, velocity, and acceleration of particle – plane motion path of particle – description of plane motion using Cartesian axes – projectiles - tied motion for particle in straight path – motion in fixed axes -motion in polar axes –					

	relative motion between particles - tied motion for particle in circular path – principle of work and energy of motion– principle of conservation of mechanical energy – principle of impulse and momentum of rigid body.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours/week.
BAS023	**Physics 2**				**(6 Contact)**
Content	Electricity and magnetism: charge and substance- electric field- column's law- electric flux- Gauss law- electric volt- condenser and insulation materials- current, resistance and electric force – ohm's law and simple circuits- magnetic field- Babot and Savart laws – magnetic flux and gauss law- Faraday law - Magnetic impedance Topics: engineering light – light properties for spherical surfaces – lenses and mirrors – wave properties for light and Hymen's principle - interference - polarization- and diffraction - Nuclear physics: nuclear construction – Bohar theorem – principle of quantum theory- laser – optical – electric phenomenon.				
Lecture	2 hours / week	**Laboratory**	2 hours / week	**Tutorial**	2 hours / week
BAS024	**Production Engineering**				**(5 Contact)**
Content	The engineering substances and its properties - heating and cooling diagrams – heating equilibrium diagrams - alloys - casting operation (sand casting and the preparation of the mold) – forming processes (cold and hot forming: forging - rolling – wire drawing – blanking and piercing - deep drawing - the extrusion) – processes of metal connections (the riveting – welding with its types sticking) – cutting processes (cutting elements – processes – hand machining – automatic cutting machining: lathing - shaping – drilling –milling - grinding – work piece fixation - cutting tools fixation - specifications of the operating machine) – measuring tools (venire caliper – micrometers and its types) – engineering specifications – production cycle – production efficiency - industrial safety – practical training in the different workshops.				
Lecture	3 hours / week	**Laboratory**	2 hours / week.	**Tutorial**	-
BAS025	**Introductions to Engineering and Environment**				**(2 Contact)**
Content	**Engineering concepts**: What is engineering – international classification for the engineering jobs – relation between engineering development and environment economic and social development – engineering branches – ethics of the engineering jobs. **Introduction to environmental science**: the importance of studying environmental science – modern technology and its effect on the environment – quality of the environment and development elements – sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution –noise) – economics of environmental pollution control – legislations for the environment protection.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	-
BAS026	**Technical English Language 1**				**(4 Contact)**
	Intensive guided practice in reading and analyzing expository and argumentative				

Content	prose and in writing and revising essays that demonstrate coherent logical development, an ability to employ effective strategies of argument and persuasion, and a command of written English appropriate for college-level work				
Lecture	2 hours / week	**Laboratory**	2hours /week.	**Tutorial**	-
BAS027	**Human rights**				**(2 Contact)**
Content	الالمام بأهمية حقوق الانسان والنشأة التاريخية لتلك الحقوق والمدارس الفقهية لتأصيل تلك الحقوق واحكام الاتفاقيات الدولية الخاصة بحقوق الانسان، والمنظمات الدولية العالمية والاقليمية القائمة على حماية تلك الحقوق، وموقف الدستور المصري من حقوق الانسان، والحماية القانونية لها على الصعيد الوطني والصعيد الدولي، بالإضافة الي حقوق الانسان في الشريعة الاسلامية. الاصول التاريخية الفلسفية لحقوق الانسان المصادر الدولية لحقوق الانسان (العالمية والاقليمية) المصادر الوطنية لحقوق الانسان الحماية الاجهزة العالمية القائمة على حماية حقوق الانسان (اجهزة الامم المتحدة) الحماية الوطنية لحقوق الانسان حقوق الانسان في الشريعة الاسلامية عرض لبعض طوائف حقوق الانسان				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	-

LEVEL1-SEMESTER1					
BAS111	**Mathematics 3**				**(4 Contact)**
Content	**Partial differentiation applications**: maximum and minimum values in more than one variable – directional analysis - the directional differential effects - the multi-integrations and its applications (the curved and the orthogonal axis) – Gauss- Stokes theory - the endless series and function expansion – basic concepts for the convergence and divergence. **Ordinary differential equations:** The first order (the equations which can be separated, homogeneous, exact and linear) - the ordinary differential equations from the second order and higher orders (with constant and variable coefficients), systems from the ordinary differential equations– Laplace transfer and its applications in the solution of differential equations.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
BAS112	**Electrical Engineering Fundamentals**				**(5 Contact)**
Content	Direct Current - Theory of electric circuits- Delta and Star connections - Sine A.C and D.C circuits - Time vectors diagram- Electric power and power factor in A.C circuits - 3-Phase current - Electric machines - D.C machines – Transformers - Induction and synchronous machines - Fractional power machines.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
BAS113	**Engineering Thermodynamics**				**(5 Contact)**
Content	Fundamental concepts - Properties of a pure substance – Equation of state - thermodynamic systems - Work and heat - First law of thermodynamics; Applications to Systems and Control Volumes - Second Law of Thermodynamics; Principle of Carnot cycles; Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy - Applications to systems and control volumes - Irreversibility and availability - Power and refrigeration cycles.				

Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours/ week.
BAS0114	**Technical English Language 2**				**(4 Contact)**
Content	Introduction to academic research and writing through intensive investigation of an issue or topic specified by the instructor. Students will be required to develop and organize a substantial research project related to the topic of the course and to demonstrate the information literacy skills required to find, evaluate, and make appropriate use of primary and secondary materials relevant to their project.				
Lecture	2 hours / week	**Laboratory**	2hours /week.	**Tutorial**	-
BAS115	**Computer Programming**				**(4 Contact)**
Content	Basic concepts of programming, problem analysis and developing the programs charts, Primitive data types, operators, variables, Joptionpane & scanner Classes. Flow control I: If statement, If -Else, Nested IF, Switch. Flow control II: for statement, while, do-while, continue, return. Introduction to classes, objects and methods. Introduction to Graphical User Interface (GUI). Java Applets				
Lecture	2 hours / week	**Laboratory**	2hours /week.	**Tutorial**	-
CEE111	**Electronics 1**				**(5 Contact)**
Content	**Semiconductor basics**: doping-n type and p type materials, PN junction, depletion region, barrier potentials. SEMICONDUCTOR DIODE: PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics. SPECIAL **SEMICONDUCTOR DIODE:** Schottky barrier diode-Zener Diode-Varactor diode, Tunnel diode, LASER diode, LED, LCD, Photo transistor and solar cell. **BIPOLAR JUNCTION:** NPN-PNP -Junctions-Early Effect-Current equations – Input and Output characteristics of CE, CB CC. FIELD EFFECT TRANSISTORS: JFETs – Drain and Transfer characteristics, -Current Equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET, Current equation - Equivalent circuit model and its parameters.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
LEVEL1-SEMESTER2					
BAS121	**Mathematics 4**				**(4 Contact)**
Content	Special functions – Fourier series - periodic functions and Euler's laws – Fourier's integrations – solutions of the differential equations by series - solving the partial differential equations using variables separation. Functions with complex variables – complex quantities algebra– multiple values functions - the analytical functions and Koshi's theorem - the complex series – Taylor and Lorant series - the zeros, unique points and the rest - the infinite series.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours /week

BAS122	**Technical Report Writing**				**(4 Contact)**	
Content	Writing the scientific reports by English language: The principles of report preparation - types of reports – formatting the reports – skills of figures and shapes – importing text – chart drawings – optical scanning for the pictures and documents – the border and notes operations in the reports. Saving and indexing the reports – searching for text – coping and safety of information – using the different computer programs packages for writing and demonstrating the reports.					
Lecture	2 hours / week	**Laboratory**	2 hours / week.	**Tutorial**	-	
BAS123	**Introductions to Information Technology**				**(4 Contact)**	
Content	Introduction to the design and use of computer-based information systems - Software and hardware used in information systems - information requirements - Communication systems – Networking - The internet; the foundations, resources and uses of the internet, emphasizing practical skills for finding, reading and authorizing materials - Fundamentals of computer communication networks – Introduction to computer networking elements; communications architectures and protocols, HTML principles and applications - Case studies.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE121	**Electronics Tests 1**				**(4 Contact)**	
Content	Conducting experiments which covers the basics of electronics and the logical circuits using testing and electronic measurement equipment's – Methods of measurements such as: Series and parallel resistors, voltage divider, Capacitor in dc circuit, DC block capacitor, RL circuits, Verifications of KVL & KCL, Verifications Of Thevenin & Norton theorem, Verifications Of Super Position Theorem, verifications of maximum power transfer theorem, Determination of resonance frequency of Series & Parallel RLC Circuits, Characteristics of PN Junction Diode, Diode applications (half –and full wave rectifier-deign DC power supply- Diode clipper and clamper).					
Lecture	1 hours / week	**Laboratory**	2 hours / week.	**Tutorial**	-	
CEE122	**Electronics 2**				**(5 Contact)**	
Content	The characteristics and processing of (JFET) and (MOSFET) - the effect of the surfaces - effect of the narrow canal - different types for MOS - feeding circuits of FET - Digital and analog applications of FET - single circuits industry - elements of the mobile charge - the integrated circuits with high numbers - the testing of a correlation and assembling of the integrated circuits - the basic regular circuits (the transistors) – design of power circuits - nourishing an organizer - the resort the volt - PNPN valve - THYRISTOR applications – two directions equipment - the cell of the semi-conductive and its related equipment.					
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE123	**Electronics and Electrical Measurements**				**(5 Contact)**	
Content	**DC MACHINES: Three phase circuits, a review. Construction** of DC machines – Theory of operation of DC generators– Characteristics of DC generators- Operating principle of DC motors – Types of DC motors and their characteristics – Speed control of DC motors- Applications. TRANSFORMER: Introduction – Single phase transformer construction and					

	principle of operation – EMF equation of transformer-Transformer no–load phasor diagram — Transformer on–load phasor diagram — Equivalent circuit of transformer – Regulation of transformer –Transformer losses and efficiency-All day efficiency –auto transformers. INDUCTION MACHINES AND SYNCHRONOUS MACHINES: Principle of operation of three-phase induction motors – Construction –Types-Equivalent circuit - Construction of single-phase induction motors- Types of single-phase induction motors – Double revolving field theory – starting methods - Principles of alternator – Construction details – Types – Equation of induced EMF – Voltage regulation. Methods of starting of synchronous motors – Torque equation – V curves – Synchronous motors. BASICS OF MEASUREMENT AND INSTRUMENTATION: Static and Dynamic Characteristics of Measurement – Errors in Measurement - Classification of Transducers – Variable resistive – Strain Guage, thermistor RTD transducer - Variable Capacitive Transducer – Capacitor Microphone - Piezo Electric Transducer – Variable Inductive transducer –LVDT, RVDT. **ANALOG AND DIGITAL INSTRUMENTS: DVM, DMM–**Storage Oscilloscope. Comparison of Analog and Digital Modes of operation, Application of measurement system, Errors. Measurement of R, L and C, Wheatstone, Kelvin, Maxwell, Anderson, Schering and Wien bridges Measurement of Inductance, Capacitance, Effective resistance at high frequency, Q-Meter.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	

LEVEL2-SEMESTER1						
BAS211	**Engineering Probability and Statistics**					**(4 Contact)**
Content	Probability theory. Discrete and continuous probability distributions. Statistics in engineering. Descriptive Statistics Sampling distributions. Estimation and confidence intervals. Hypothesis testing. Simple regression.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week	
BAS212	**Fluid Mechanics**					**(4 Contact)**
Content	Fluid properties, fluid statics, kinematics, fluid dynamics including energy and momentum equations, dimensional analysis, laminar flow, turbulent flow and its applications, forces on immersed bodies, introduction to compressible flow, applications to filtration and fluidization. Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes, center of pressure, flow measuring apparatus, multi-pump test (Pump characteristics) and losses in piping systems.					
Lecture	2 hours / week	**Laboratory**	1hours / week.	**Tutorial**	1 hours /week.	
BAS213	**Engineering Economy**				**(3 Contact)**	
Content	This course covers the basic concepts of engineering economics as applied to the evaluation of capital investment alternatives in both the private and public sectors of our economy. Attention is given to the time value of money by showing the concepts and techniques for evaluating the worth of products, systems, structures,					

	and services in relation to their cost. Economic and cost concepts: calculating economic equivalence, comparison of alternatives and replacement economy. Economic optimization in design and operations. Cost estimation of products and systems.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	1 hours / week.
BAS214	**Advanced Computer Programming**				**(4 Contact)**
Content	Object Oriented Programming introduction: Methods – Classes and Objects: Controlling access to members, Constructor, Overloaded Constructor, software Reusability, Package access, Arrays.Object Oriented Programming Concepts: Encapsulation, Inheritance, Polymorphism. Graphical User Interface (GUI): Event handler, text field, list, Multiple Selection lists, Panel, Radio buttons, Checkboxes, layout, Menus, Frames, Popup, Tabbed Pane. Database Basics				
Lecture	2 hours / week	**Laboratory**	2 hours /week.	**Tutorial**	-
CEE211	**Fundamentals of Electromagnetism**			**(4 Contact)**	
Content	**STATIC ELECTRIC FIELD:** Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charge distributions, Electric flux density, Gauss law and its applications, Gauss divergence theorem, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy, and Energy density. **CONDUCTORS AND DIELECTRICS**: Conductors and dielectrics in Static Electric Field, Current and current density, Continuity equation, Polarization, Boundary conditions, Method of images, Resistance of a conductor, Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditions for perfect dielectric materials, Poisson's equation, Laplace's equation, Solution of Laplace equation, Application of Poisson's and Laplace's equations. **STATIC MAGNETIC FIELDS:** Biota -Savart Law, Magnetic field Intensity, Estimation of Magnetic field Intensity for straight and circular conductors, Ampere's Circuital Law, Point form of Ampere's Circuital Law, Stokes theorem, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Derivation of Steady magnetic field Laws. **MAGNETIC FORCES AND MATERIALS:** Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability Magnetic boundary conditions involving magnetic fields, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance, Basic expressions for self and mutual inductances, Inductance evaluation for solenoid, toroid, coaxial cables and transmission lines, Energy stored in Magnetic fields. **TIME VARYING FIELDS AND MAXWELL'S EQUATIONS:** Fundamental relations for Electrostatic and Magnetostatic fields, Faraday's law for Electromagnetic induction, Transformers, Motional Electromotive forces, Differential form of Maxwell's equations, Integral form of Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave				

	equations and their solutions, Pointing's theorem, Time harmonic fields, Electromagnetic Spectrum.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE212	**Logical and digital circuits**				**(4 Contact)**	
Content	Boolean algebra – Logic gates – Logic Minimization - Logic and digital units concepts–number systems and data representation–k-maps Boolean algebra– decision elements – combinational and sequential circuits – flip - flops – minimization techniques , design and construction of logic subsystems – such as decoders , multiplexers , adders , and multipliers – Combinational logic circuits – sequential logic circuits –Introduction to AID and DIA converters – Introduction to digital Integrated circuits.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
LEVEL2-SEMESTER2						
BAS221	**Numerical Methods in Engineering**				**(4 Contact)**	
Content	**Error! Hyperlink reference not valid.**Numerical solution of linear and nonlinear systems - Numerical differentiation and integration - Curve fitting and interpolation - Numerical solution of initial value problems - Boundary and eigen value problems.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours /week.	
BAS222	**Computer Organization**				**(4 Contact)**	
Content	An Introduction to a Simple Computer: CPU Basics and Organization, Bus, Clocks, Input/Output Subsystem, Memory Organization and Addressing, Interrupts. -Marie Machine: The Architecture, Registers and Buses, Instruction Set Architecture, Register Transfer Notation, Instruction Processing, The Fetch-Decode-Execute Cycle, A Simple Program, What Do Assemblers Do, Extending Our Instruction Set, -A Discussion on Decoding—Hardwired vs. Microprogrammed Control. -A Closer Look at Instruction Set Architectures: Instruction Formats, Design Decisions for Instruction Sets, Little versus Big Endian, Internal Storage in the CPU - Stacks versus Registers, Number of Operands and Instruction Length, Instruction-Level Pipelining. -Types of Memory: Memory Hierarchy, Locality of Reference, Cache Memory, Virtual Memory -Input/output and Storage Systems: Introduction, Amdahl's Law, I/O Architectures, I/O Control Methods, I/O Bus Operation, Magnetic Disk Technology, Rigid Disk Drives, Optical Disks					
Lecture	2 hours /week	**Laboratory**	-	**Tutorial**	2 hours / week.	
BAS223	**Engineering Management**				**(3 Contact)**	
Content	management – planning – individual and group decision making – organizational culture, structure and design of management – motivating employees – leadership – interpersonal and organizational communication – control techniques for enhancing organizational effectiveness – the human relationships and the organizational behavior.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	

CEE221	**Electronic Circuits 1**			**(4 Contact)**	
Content	**POWER SUPPLIES AND BIASING OF DISCRETE BJT AND MOSFET:** Rectifiers with filters- DC Load line, operating point, Various biasing methods for BJT –Design Stability-Bias compensation, Thermal stability, Design of biasing for JFET, Design of biasing for MOSFET. **BJT AMPLIFIERS:** Small signal Analysis of Common Emitter-AC Load line, Voltage swing limitations, Common collector and common base amplifiers – Differential amplifiers- CMRR- Darlington Amplifier- Bootstrap technique - Cascaded stages - Cascade Amplifier-Large signal Amplifiers – Class A, Class B and Class C Power Amplifiers. **JFET AND MOSFET AMPLIFIERS:** Small signal analysis of JFET amplifiers- small signal Analysis of MOSFET and JFET, Common source amplifier, Voltage swing limitations, small signal analysis of MOSFET and JFET Source follower and Common Gate amplifiers, - Bims Cascade amplifier. **FREQUENCY ANALYSIS OF BJT AND MOSFET AMPLIFIERS:** Low frequency and Miller effect, High frequency analysis of CE and MOSFET CS amplifier, short circuit current gain, cut off frequency – fα and fβ unity gain and Determination of bandwidth of single stage and multistage amplifiers. **IC MOSFET AMPLIFIERS:** IC Amplifiers-IC biasing Current steering circuit using MOSFET- MOSFET current sources- PMOS and NMOS current sources. Amplifier with active loads - enhancement load, Depletion load and PMOS and NMOS current sources load- CMOS common source and source follower- CMOS differential amplifier- CMRR.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.

CEE222	**Electronic Tests 2**			**(5 Contact)**	
Content	Conducting experiments which covers the way of using oscilloscopes, and other experiments such: Zener diode characteristic curves, Voltage regulation using Zener diodes, Clipping circuits using Zener diodes, Design DC power supply, Bipolar junction transistor characteristic curves, Bipolar junction transistor as a switch, Bipolar junction transistor as an Amplifier, Design an audio amplifier, Junction field effect transistor curves, Metal oxide field effect transistor characteristic curves, MOSFET as a switch, JFET as an amplifier, Troubleshooting (BJT and FET).				
Lecture	2 hours / week	**Laboratory**	3 hours / week.	**Tutorial**	-

CEE223	**Automatic Control**			**(5 Contact)**	
Content	**CONTROL SYSTEM MODELING:** Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems -Block diagram reduction Techniques - Signal flow graph TIME RESPONSE ANALYSIS: Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB. **FREQUENCY RESPONSE ANALYSIS:** Frequency Response - Bode Plot,				

	Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichols Chart - Use of Nichols Chart in Control System Analysis. Series, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB. **STABILITY ANALYSIS**: Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram - Nyquist Stability Criterion - Relative Stability, Analysis using MATLAB. **STATE VARIABLE ANALYSIS:** State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability–State space representation for Discrete time systems. Sampled Data control systems – Sampling Theorem – Sampler & Hold – Open loop & Closed loop sampled data systems				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.

CEE224	**Practical Training1**	**(0 Contact)**
Content	Students should spend 6 weeks in field training, after completing the Second level, in any Engineering Institution or Engineering Firms. Students should demonstrate the professional and practical skills they acquired during discussion with their assigned tutors.	
Industry field	**30 hours/week**	

BAS311	**Environmental Management**				**(3 Contact)**
Content	The importance of studying environmental science – modern technology and its effect on the environment – quality of the environment and development elements – sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution – noise) – economics of environmental pollution control – legislations for the environment protection.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	-

LEVEL3-SEMESTER1		
CEE311	**Signals analysis**	**(5 Contact)**
Content	**CLASSIFICATION OF SIGNALS AND SYSTEMS:** Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - CT systems and DT systems-Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable. **ANALYSIS OF CONTINUOUS TIME SIGNALS:** Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace	

	Transforms in CT Signal Analysis - Properties. **LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS:** Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis of CT systems. **ANALYSIS OF DISCRETE TIME SIGNALS:** Baseband Sampling – DTFT – Properties of DTFT - Z Transform – Properties of Z Transform. LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS: Difference Equations- Block diagram representation-Impulse response - Convolution sum- Discrete Fourier and Z Transform Analysis of Recursive & Non-Recursive systems.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE312	**Electronic Circuits 2**				**(5 Contact)**
Content	**FEEDBACK AMPLIFIERS: General** Feedback Structure – Properties of negative feedback – Basic Feedback Topologies–Feedback amplifiers – Series – Shunt, Series – Series, Shunt – Shunt and Shunt – Series Feedback – Determining the Loop Gain – Stability Problem – Nyquist Plot – Effect of feedback on amplifier poles –Frequency Compensation. **OSCILLATORS :** Classification, Barkhuizen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift –Wien bridge - Twin- T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators. **TUNED AMPLIFIERS :** Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – large signal tuned amplifiers –Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method. **WAVE SHAPING AND MULTIVIBRATOR CIRCUITS:** RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capacitor - Diode clippers, Diode comparator - Clampers. Collector coupled and Emitter coupled A stable multivibrator – Monostable multivibrator - Bistable multivibrators- Triggering methods for Bigtable multivibrators - Schmitt trigger circuit. **BLOCKING OSCILLATORS AND TIMEBASE GENERATORS**: UJT saw tooth waveform generator, Pulse transformers – equivalent circuit – response - applications, Blocking Oscillator – Free running blocking oscillator - Astable Blocking Oscillators with base timing –Push-pull A stable blocking oscillator with emitter timing, Frequency control using core saturation, Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing,				

	Time base circuits - Voltage-Time base circuit, Current-Time base circuit – Linearization through adjustment of driving waveform.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE313	**Integrated Circuits**				**(5 Contact)**
Content	**BASICS OF OPERATIONAL AMPLIFIERS:** Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations. **APPLICATIONS OF OPERATIONAL AMPLIFIERS:** Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters. ANALOG MULTIPLIER AND PLL: Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing. **ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS:** Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R / 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation Type-Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters. WAVEFORM **GENERATORS AND SPECIAL FUNCTION ICS:** Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fiber optic IC.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE314	**Electronic Tests 3**				**(5 Contact)**
Content	Experimental tests in the field of electronic circuits includes: applications on the binary's circuits – Performance of transistors – The various transistor amplifiers with single stage and multi-stages – feedback amplifiers – frequency response for amplifiers and presenting the frequency range –				

	processes amplifiers. Thyristor specifications and its applications – TRIAC and DIAC properties – operations of amplifier circuits – experiments on gates and logic circuits.					
Lecture	2 hours / week	**Laboratory**	3 hours / week.	**Tutorial**	-	
CEE315A	**Electronic design with aids of computer**				**(4 Contact)**	
Content	The electronic systems and the circulating standard components in electronic and communications - the design of the schemata and the printed circuits – the computer software packages in the electronic design – examples for the electronic design using these computer software packages.					
Lecture	2 hours /week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE315B	**Telecommunications**				**(4 Contact)**	
Content	Wireless telephony – Client circuits – Communication cables – Used tones – Telephony circuits - Communication methods - Electronic communication- Communication between cities.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE315C	**Computer circuits design**				**(4 Contact)**	
Content	Introduction to digital electronic - IC's fabrication technology- Binary circuit characteristics using transistors-logic gates families- types and characteristics, metal transistor gates- oxide -semiconductor and gates characteristics NMOS, CMOS, PMOS - regeneration digital logic circuits - flip-flops - Schmitt impulse -multi vibrator circuits - temporary ICS - semiconductor memory - ROM types, static and dynamic writing - power sources and regulators - Energy loss Data Bus.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
LEVEL3-SEMESTER2						
BAS321	**Project Management and Control**				**(4 Contact)**	
Content	Development, negotiation and specification of project contract. Project planning and control using activity network models; network logic; scheduling; resource allocation; time-cost trade off methods; multi-project resource allocation and leveling using available industrial software.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE321	**Optical semiconductors**				**(5 Contact)**	
Content	Fundamentals of light wave communication in optical fiber waveguides, physical description of fiber optic systems. Properties of optical fiber and fiber components. Electro-optic devices: light sources and modulators, detectors and amplifiers; optical transmitter and receiver systems. Fiber optic link design and specification; fiber optic networks.					
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE322	**Microprocessor Systems**				**(5 Contact)**	

Content	**THE 8086 MICROPROCESSORS:** Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation. 8086 SYSTEM BUS STRUCTURE 9 8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Coprocessor, closely coupled and loosely Coupled configurations – Introduction to advanced processors. **I/O INTERFACING:** Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller. MICROCONTROLLER: Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming. UNIT **INTERFACING MICROCONTROLLER:** Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.				
Lecture	3 hours / week	**Laboratory**	2 hours / week.	**Tutorial**	-
CEE323	**Electromagnetic Waves**				**(5 Contact)**
Content	**WAVE PROPAGATION IN DIFFERENT MEDIA:** Wave propagation in the different media - wave propagation in ideal and actual (with loss) materials – reflection and movement of waves on the flat surfaces – non vertical projection for plane waves in lossless medium. **TRANSMISSION LINE THEORY:** General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading and different methods of loading - Line not terminated in Z0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss. **HIGH FREQUENCY TRANSMISSION LINES:** Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short-circuited lines-Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength. **Impedance Matching in High Frequency Lines:** Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of				

	problems using Smith chart - Single and double stub matching using Smith chart. **WAVE GUIDES AND CAVITY RESONATORS** General Wave behaviors along uniform Guiding structures, Transverse Electromagnetic waves, Transverse Magnetic waves, Transverse Electric waves, TM and TE waves between parallel plates, TM and TE waves in rectangular wave guides, Bessel's differential equation and Bessel function, TM and TE waves in Circular wave guides, Rectangular and circular cavity Resonators.				
Lecture	3 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE324	**Electronic tests 4**				**(4 Contact)**
Content	Laboratory experiments in the field of electronic circuits include: optics analyzers, digital measuring devices – digital harmonic plotters – logical analyzers –The vibrators – the governed vibrators by the volt – the suddenly closing circuits –the harmonious amplifiers – the rates of the expansion and the retrievers. Laboratory experiments in the electronic circuits engineering, communications and fine and optical waves.				
Lecture	1 hours / week	**Laboratory**	3 hours / week.	**Tutorial**	-
CEE325A	**Printed Circuit Design and Fabrication**				**(4 Contact)**
Content	Printed Circuit Board (PCB) scales (size and types)- Surface treatments – Capacitors and coils for PCB connection – Spaces connection – Actual resources and earth's connectors- Components for positioning – Cooling requirements and Group density- Tests for surface- Design rules for different PCB and their applications: Digital, Analog, High frequency, and auto-technical. Programs for PCB design – PCB safety – Light printing – Silk-screen printing – Electronic board's fabrication – Auto-mechanical operations in PCB technology- Multi-layered boards – Technical methods for welding and assembly components.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE325B	**Mobile communications systems**				**(4 Contact)**
Content	**WIRELESS LAN:** Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hipper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX. **MOBILE NETWORK LAYER:** Introduction - Mobile IP: IP packet				

	delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad- hoc network: Routing, Destination Sequence distance vector, Dynamic source routing. **MOBILE TRANSPORT LAYER:** TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks. **WIRELESS WIDE AREA NETWORK**: Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3GSGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol. **4G NETWORKS:** Introduction – 4G vision – 4G features and challenges - Applications of 4G. 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio. **5G Technologies:** Drivers for 5G: The 'Pervasive Connected World - The 5G Internet - Small Cells for 5G Mobile Networks.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE325C	**Wireless Communications**				**(4 Contact)**
Content	Multidisciplinary, project-oriented design course that considers aspects of wireless and mobile systems including wireless networks and link protocols, mobile networking including support for the Internet Protocol suite, mobile middleware, and mobile applications. Students complete multiple experiments and design projects.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE326	**Practical Training 2**				**(0 Contact)**
Content	Students should spend 6 weeks in field training, after completing the Third level, in any Engineering Institution or Engineering Firms. They should prepare a technical report implying a full description of the processes they joined for training. Students should demonstrate the professional and practical skills they acquired during discussion of report with their assigned tutors.				
Industry field	**30 hours/week**				

LEVEL4-SEMESTER1

CEE411	**Digital Signal Processing**				**(4 Contact)**
Content	**DISCRETE FOURIER TRANSFORM:** Discrete Signals and Systems- A Review – Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms – Decimation in time Algorithms, Decimation in frequency Algorithms – Use of FFT in Linear Filtering. **IIR FILTER DESIGN**: Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation. **FIR FILTER DESIGN:** Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, and Hanning Window), Frequency sampling techniques – Finite word length effects in digital Filters: Errors, Limit Cycle, and Noise Power Spectrum. FINITE WORDLENGTH EFFECTS: Fixed point and floating point number representations – ADC –Quantization- Truncation and Rounding errors - Quantization noise – coefficient quantization error – Product quantization error - Overflow error – Roundoff noise power - limit cycle oscillations due to product round off and overflow errors – Principle of scaling DSP APPLICATIONS: Multidate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor – Adaptive Filters: Introduction, Applications of adaptive filtering to equalization.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE412	**Communication systems**				**(5 Contact)**
Content	**Introduction to communication systems:** Elements of communication system, Frequency spectrum, need for modulation, types of modulation, TDM, FDM, Noise, Signal to noise ratio, noise figure, noise temperature, noise calculation in single and cascaded stages. **Modulation techniques**: Time domain equation of AM wave, Modulation index, effects of over modulation, bandwidth, power and voltage calculations of AM signal, Suppressed carrier and single sideband techniques, angle modulation- its types, Time domain equation of FM wave, Modulation index, bandwidth, side bands, power of side bands, frequency deviation, pre-emphasis, de-emphasis, FM stereo system, merits and demerits of FM over AM. Transmitters and Receivers: Specifications of transmitters, low level modulation, high level modulation, heterodyne type transmitters, SSB transmitter, FM transmitter, Armstrong method of FM generation, sensitivity, selectivity, fidelity of receiver, Crystal receiver, TRF receiver, super heterodyne AM receiver, selection of IF, IF amplifier circuits, AVC, IMRR, FM receiver, FM detector (Foster Seeley), Noise limiter circuit, comparison of AM & FM receivers.				
Lecture	3 hours /	**Laboratory**	-	**Tutorial**	2 hours / week.

	week					
CEE413	**Communication networks**				**(4 Contact)**	
Content	**FUNDAMENTALS & LINK LAYER:** Building a network – Requirements- Layering and protocols - Internet Architecture – Network software – Performance; Link layer Services - Framing - Error Detection - Flow control. **MEDIA ACCESS & INTERNETWORKING:** Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP). **ROUTING:** Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM). **TRANSPORT LAYER:** Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (Debit, RED) – QoS – Application requirements. **APPLICATION LAYER:** Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE414	**Antennas and wave propagation**				**(4 Contact)**	
Content	**FUNDAMENTALS OF RADIATION:** Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, half wave dipole, folded dipole, and Yagi array. **APERTURE AND SLOT ANTENNAS:** Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna, Reflector antenna, Aperture blockage, Feeding structures, Slot antennas, Microstrip antennas – Radiation mechanism – Application, Numerical tool for antenna analysis. **ANTENNA ARRAYS**: N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array. **SPECIAL ANTENNAS:** Principle of frequency independent antennas – Spiral antenna, Helical antenna, Log periodic. Modern antennas-Reconfigurable antenna, Active antenna, Dielectric antennas, electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR **PROPAGATION OF RADIO WAVES:** Modes of propagation, Structure of atmosphere, Ground wave propagation, Tropospheric propagation, Duct propagation, Troostite propagation, Flat earth and curved earth concept Sky wave propagation – Virtual height, critical frequency, Maximum usable frequency – Skip distance, Fading, Multi hop propagation.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE415A	**Artificial intelligence**				**(4 Contact)**	

Content	Fundamental of artificial intelligent – random search – knowledge coding – Mathematical logic for knowledge - engineering and expert systems – Natural language processing – Knowledge representation – production system – Robots – Condensed introduction to programming using Li sip language and overall review for programming by Prolog language – programming applications in AI field focusing on: structure of customer accounting system including research operations, logical presentation, and decision making process in the uncertainty case - computer vision and neural networks.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE415B	**Advanced electronic measurements**				**(4 Contact)**
Content	Integrated measurements amplifiers – comparisons and taking of the samples and the stopping - the converters (digital/analogs and analog/digital) - the electric variables - signals preparation and its filtration – idle elements – systems and components of signals attainments.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE415C	**Special Topics in Communication Engineering**				**(4 Contact)**
Content	A topic to be selected by the department to address new subjects in Communications Engineering.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE416	**Project 1***				**(5 Contact)**
Content	Students will be assigned projects in which they will be expected to apply Principles of Communications and Electronics Engineering, analysis and design to solve a given real world problem. Reports and presentations will be emphasized in addition to the technical content.				
Lecture	2 hours / week	**Laboratory**	2hours / week.	**Tutorial**	-
BAS421	**Research and Analytic skills**				**(2 Contact)**
Content	مهارات التحليل: إطار التحليل للمسائل الهندسية مع الاخذ في الاعتبار النواحي الفنية، الاقتصادية، البيئية، والاخلاقية. أطوار حل المسائل (فهم المسألة وصياغتها، خطة الحل، تنفيذ الخطة، التقييم، أوجه القوة، أوجه الضعف، الفرص، (SWOTوالمراجعة.) دور الابداع في التحليل. تحليل والمخاطر) بالنسبة للبدائل المختلفة. التحليل التفصيلي للتكلفة-الفائدة، وكذلك تحليل المخاطر دور التعاون وعمل الفريق في تحليل المسائل الكبيرة. اهمية العثور على البيانات والمعلومات والمعارف المناسبة. مهارات البحث: الطرق الاساسية للبحث باستخدام الروابط المنطقية مثل)AND,OR,NOT (كيفية البحث باستخدام العبارات، العناوين المجال، الحاسب المضيف، (URL وكذلك الروابط. تقييم نتائج البحث اختيار محرك البحث المناسب. أهمية تقييم مصداقية الاماكن المتاحة على الشبكة المعرفية العالمية.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	-
CEE421	**Luminous Communications**				**(4 Contact)**
Content	**INTRODUCTION TO OPTICAL FIBERS:** Evolution of fiber optic system- Element of an Optical Fiber Transmission link-- Total internal reflection-Acceptance angle –Numerical aperture – Skew rays Ray Optics- Optical Fiber Modes and Configurations -Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts Linearly				

	Polarized Mode-Single Mode Fibers-Graded Index fiber structure. **SIGNAL DEGRADATION OPTICAL FIBERS:** Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination - Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling -Design Optimization of SM fibers-RI profile and cut-off wavelength. **FIBER OPTICAL SOURCES AND COUPLING:** Direct and indirect Band gap materials-LED structures -Light source materials -Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition -Rate equations -External Quantum efficiency -Resonant frequencies -Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lancing schemes, Fiber -to- Fiber joints, Fiber splicing-Signal to Noise ratio , Detector response time. FIBER OPTIC RECEIVER AND MEASUREMENTS: Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration– Probability of Error– Quantum limit. Fiber Attenuation measurements-Dispersion measurements – Fiber Refractive index profile measurements. **FIBER OPTIC RECEIVER AND MEASUREMENTS:** Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration– Probability of Error– Quantum limit. Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements. **OPTICAL NETWORKS AND SYSTEM TRANSMISSION:** Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks – Wavelength Routed Networks – Nonlinear effects on Network performance –-Link Power budget -Rise time budget Noise Effects on System Performance-Operational Principles of WDM Performance of WDM + EDFA system – Solutions – Optical CDMA – Ultra High-Capacity Networks.

Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	

CEE422	**Electronic tests 5**					**(4 Contact)**
Content	Laboratory experiments in the fields of: digital communication system – properties of closed phase ring – optical communication systems – television circuits properties – antennas, fine waves and micrometry circuits – integrated circuits.					
Lecture	2 hours / week	**Laboratory**	3 hours / week.	**Tutorial**	-	

CEE423	**Digital Communications**	**(4 Contact)**
Content	**SAMPLING & QUANTIZATION:** Low pass sampling – Aliasing-Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Commanding of speech signal- PCM – TDM. WAVEFORM CODING: Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear Predictive	

	Coding. **BASEB AND TRANSMISSION:** Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ - Manchester- ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding - Mary schemes – Eye pattern – Equalization. **DIGITAL MODULATION SCHEME:** Geometric Representation of signals- Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Carrier Synchronization - structure of Non-coherent Receivers - Principle of DPSK. ERROR CONTROL CODING: Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder.				
Lecture	3 hours / week	**Laboratory**	2 hours / week	**Tutorial**	.-
CEE424A	**Radar systems**				**(4 Contact)**
Content	**INTRODUCTION TO RADAR EQUATION:** Introduction- Basic Radar – The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar - Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters- System losses –Other Radar Equation Considerations. **MTI AND PULSE DOPPLER RADAR:** Introduction to Doppler and MTI Radar- Delay –Line Cancellers- Staggered Pulse Repetition Frequencies – Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) – Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar – Monopoles Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT). **DETECTION OF SIGNALS IN NOISE:** Matched –Filter Receiver – Detection Criteria – Detectors –-Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction - Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas – Phase Shifters - Frequency-Scan Arrays Radar Transmitters and Receivers - Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter.- The Radar Receiver - Receiver noise Figure – Super heterodyne Receiver -Duplexers and Receiver Protectors- Radar Displays.				

	RADIO DIRECTION AND RANGES: Introduction - Four methods of Navigation .- The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders – The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR – Recent Developments. Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System -Decca Receivers - Range and Accuracy of Decca - The Omega System.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE424B	**Satellite systems**				**(4 Contact)**
Content	**SATELLITE ORBITS:** Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse- Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion. **SPACE SEGMENT AND SATELLITE LINK DESIGN:** Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime. **EARTH SEGMENT:** Introduction – Receive – Only home TV systems – Outdoor unit – Indoor unit for analog (FM) TV –Master antenna TV system – Community antenna TV system – Transmit – Receive earth stations – Problems – Equivalent isotropic radiated power – Transmission losses – Free-space transmission –Feeder losses – Antenna misalignment losses – Fixed atmospheric and ionospheric losses – Link power budget equation – System noise – Antenna noise – Amplifier noise temperature – Amplifiers in cascade – Noise factor – Noise temperature of absorptive networks – Overall system noise temperature – Carrier to- Noise ratio – Uplink – Saturation flux density – Input back off – The earth station - HPA – Downlink – Output back off – Satellite TWTA output – Effects of rain – Uplink rain–Fade margin – Downlink rain – Fade margin – Combined uplink and downlink C/N ratio – Inter modulation noise. **SATELLITE ACCESS:** Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Breast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption. **SATELLITE NAVIGATION SYSTEM:** Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment - Instrument Landing System - Ground Controlled Approach System -				

	Microwave Landing System (MLS) The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth – Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems-The Transit System - Navistar Global Positioning System (GPS). **SATELLITE APPLICATIONS:** INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE424C	**Computer Engineering**				**(4 Contact)**
Content	The basics of the computer organization – computer instructions – processing unit – design of arithmetic logic units – Control unit – control by micro programs – memory organization –operating systems – time management – assumptions and the measurement of the goals – politics – space management – the levels of storage – address translation – the pages – the files – structures of the files – user interface – the orders translator – the helpful and reactive programs – the synchronization – basics of networks.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE424D	**Neural networks**				**(4 Contact)**
Content	Introduction to natural Neural structure – introduction to Artificial Neural Networks and parallel processing – Artificial Neural Networks main components – Neural Networks classification – supervised Neural Networks learning – self organizing learning – Neural Networks design – preprocessing data – network structure – learning Algorithms – artificial Neural Networks multilayer models – Hopfield model – Boltzmann model - Neural Networks and expert systems – multilayer neural network applications.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE425A	**Robotics And Automation**				**(4 Contact)**
Content	BASIC CONCEPTS: Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots. POWER SOURCES AND SENSORS: Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging –laser – acoustic – magnetic, fiber optic and tactile sensors. MANIPULATORS, ACTUATORS AND GRIPPERS: Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – U				

	various types of grippers – design considerations. KINEMATICS AND PATH PLANNING: Solution of inverse kinematics problem – multiple solution Jacobian work envelop – hill Climbing Techniques – robot programming languages. CASE STUDIES: Multiple robots – machine interface – robots in manufacturing and non-manufacturing applications –robot cell design – selection of robot.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE425B	**Fundamentals of Biomedical Engineering**				**(4 Contact)**
Content	The safety and the insulations in the medical equipment - the manners of the noise deletion - the hearted helpful equipment – physiological measurements and the vital sensitivity - a processing of the vital signals and different photographic methods.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE425C	**Industrial Electronics**				**(4 Contact)**
Content	The usage of electronics in measurement equipment: Length and temperature – self waves and its usage in intelligence systems – circuit bracers and its usage in industry and traffic control – noise measurement system – different heating system using high frequency for conductive materials – sensitivity systems – loading systems – temperature recording and magnetic amplifiers – exhaust system analysis – control system for power system.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE425D	**Introductions to VLSI Design**				**(4 Contact)**
Content	MOS TRANSISTOR PRINCIPLE: NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams COMBINATIONAL LOGIC CIRCUITS: Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles. SEQUENTIAL LOGIC CIRCUITS: Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design. DESIGNING ARITHMETIC BUILDING BLOCKS: Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff. IMPLEMENTATION STRATEGIES: Full custom and Semi-custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.				
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.
CEE425E	**Microwave electronics**				**(4 Contact)**
	Guidance for the rectangular and cylindrical waves – idle main				

Content	components – the shell lines - microwaves transistors and amplifiers – low noise amplifiers – microwaves oscillators - idle surface components - the converters and the phase displacements.					
Lecture	2 hours / week	**Laboratory**	-	**Tutorial**	2 hours / week.	
CEE426	**Project 2***				**(6 Contact)**	
Content	Continuation and conclusion of the investigations on the communication or electronic problems of Project I; written reports and team presentations are required.					
Lecture	2 hours / week	**Laboratory**	4 hours / week.	**Tutorial**	-	