English Version

Tables of Marks

Marks of courses are given as:

1- Courses with Labs

Exam	Final	Mid term	Year work	Lab &Oral	Total
Marks	40	20	20	20	100

2- Courses without Labs

Exam	Final	Mid term	Year work	Total
Marks	40	20	40	100

University Requirements Courses UR (19 Credit Hrs)

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
English 1	UR 041	1	2	-	3	2	0
English 2	UR 042	2	2	-	4	3	0
Environmental Eng.	UR 142	2	-	-	2	2	1
History of Eng. Science	UR 143	2	-	-	2	2	1
Human rights	UR 345	2	-	-	2	2	3
Engineering economics	UR 446	2	-	-	2	2	4
Quality assurance standards	UR 247	2	-	-	2	2	2
Technical reports writing	UR 347	1	2	-	3	2	3
Projects managements	UR 448	2	-	-	2	2	4

Statistical table for UR courses

Total credit	Level
5	0
4	1
2	2
4	3
4	4

College Requirements Engineering Courses CR (47 Credit Hrs)

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
Mathematics 1	CR 001	2	2	-	4	3	0
Mathematics 2	CR 002	2	2	-	4	3	0
Eng. Mathematics1	CR 106	2	2	-	4	3	1
Eng. Mathematics2	CR 107	2	2	-	4	3	1
Probability theory and random variables	CR 208	2	2	-	4	3	2
Signal analysis	CR 209	2	2	-	4	3	2
Eng. Mechanics 1	CR 003	2	2	-	4	3	0
Eng. Mechanics 2	CR 004	2	2	-	4	3	0
Physics 1	CR 011	2	2	3	7	4	0
Physics 2	CR 013	2	2	3	7	4	0
Eng. Chemistry	CR 021	2	2	3	7	4	0
Engineering drawing using computer	CR 031	1	-	6	7	3	0
Electronic circuits and components drawing using computer	CR 131	1	-	6	7	3	1
Solid state Physics	CR 132	2	2	-	4	3	1
Mechanical workshop	CR 032	1	-	3	4	2	0

Statistical Table for CR courses

Total Credit Hrs.	Level
29	0
12	1
6	2
0	3
0	4

Specialization Requirement (Major) Courses for Communications and Networks Engineering (56 Credits Hrs)

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
Electrical Eng.	ECE161	2	2	-	4	3	1
Electrical circuits	ECE261	2	2	3	7	4	2
Electronics 1	ECE171	2	2	3	7	4	1
Electronics 2	ECE172	2	2	3	7	4	1
Electronic Circuits	ECE264	2	2	3	7	4	2
Electric Power and Machines Eng.	ACE272	2	2	-	4	3	2
Fields and waves	ECE262	2	2	-	4	3	2
Communication Theory	ECE263	2	2	3	7	4	2
Computer Programming 1	CSE051	2	-	3	5	3	0
Computer Programming 2	CSE151	2	-	3	5	3	1
Computer Eng.	CSE251	2	-	3	5	3	2
Semiconductor Technology	ECE173	2	2	-	4	3	2
VLSI Technology	ECE274	2	2	3	7	4	2
Electrical Workshop	ECE181	1	-	6	7	3	1
Electronics Workshop	ECE281	1	-	6	7	3	2
Applied Project	ECE282	1	-	3	4	2	2
Summer Training 1	ECE090	-	-	3	3	1	0
Summer Tanning 2	ECE190	-	-	3	3	1	1
Summer Training 3	ECE290	-	-	3	3	1	2

Statistical Table for Specialization Courses

Total Credit Hrs.	Level
4	0
18	1
34	2
0	3
0	4

Minor Requirement Courses for Communications and Networks Engineering (53 Credits Hrs)

1- Minor Requirement Compulsory 11 courses (35 Credit Hrs)

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
Digital Communication	ECE302	2	2	3	7	4	3
Digital Signal Processing	ECE311	2	2	-	4	3	3
Digital Electronics	ECE375	2	2	-	4	3	3
Optical communication systems	ECE420	2	2	3	7	4	4
Acoustics and studio Eng.	ECE431	2	2	-	4	3	4
Comm. Networks Planning	ECE484	2	2	-	4	3	4
Computer Networks	ECE385	2	2	-	4	3	3
Wireless Networks	ECE386	2	2	-	4	3	3
Networking Fundamentals	ECE387	2	-	3	5	3	3
Networking security Fundamentals	ECE478	2	-	3	5	3	4
Graduation Project	ECE480	1	-	9	10	4	4

Statistical Table for Minor Compulsory Courses

Total Credit Hrs.	Level
0	0
0	1
0	2
19	3
16	4

2- Minor Requirement Specialization Elective Courses (18 Credits Hrs), Student should choose 4 courses (12 Credits Hrs) from List 1 in level 3, and 2 courses (6 Credits Hrs) from List 2 in level 4

List 1

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
Microwave Transmission Media	ECE380	2	2	-	4	3	3
Mobile communication systems	ECE381	2	2	-	4	3	3
Electronic exchanges	ECE382	2	2	_	4	3	3
TV. and Broadcasting Eng.	ECE383	2	2	-	4	3	3
Microwave Electronics Eng.	ECE361	2	2	--	4	3	3
Antenna and wave Prop. Eng.	ECE362	2	2	--	4	3	3
Satellites Communication systems	ECE363	2	2	--	4	3	3
Information and Coding Theory	ECE364	2	2	--	4	3	3
Data transfer systems	ECE365	2	2	--	4	3	3
Pattern recognition	ECE366	2	2	--	4	3	3
Surface acoustic Waves	ECE367	2	2	--	4	3	3
Networks Routing and switching	ECE374	2	2	-	4	3	3
Wireless sensor networks	ECE368	2	2	-	4	3	3
Wireless sensor networks protocols	ECE369	2	2	-	4	3	3
Wireless sensor networks problems	ECE371	2	2	-	4	3	3
Radio networks planning and optimization	ECE372	2	2	-	4	3	3
Optical networks	ECE373	2	2	-	4	3	3

List 2

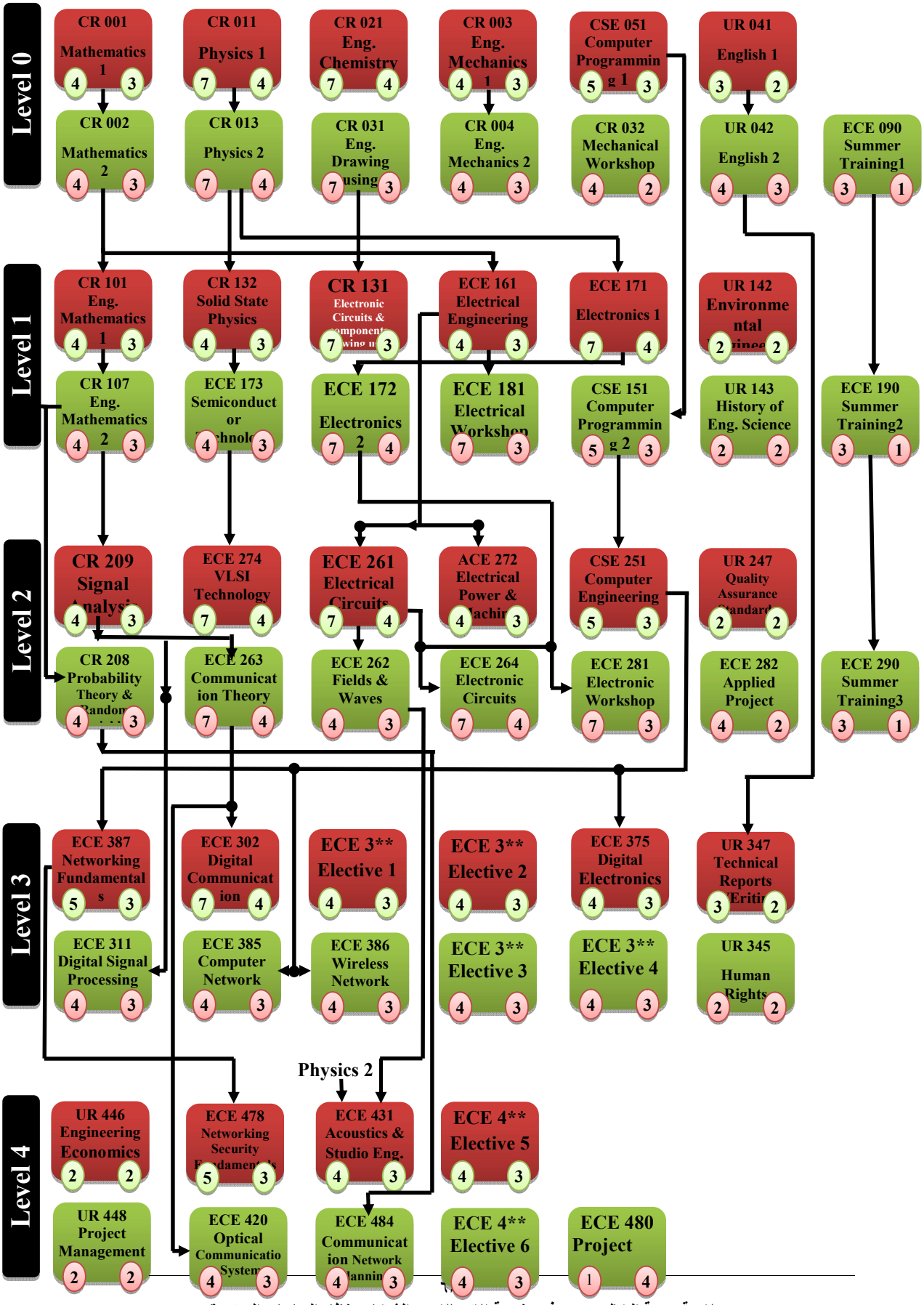
Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs	Level
Underwater Acoustics and applications	ECE462	2	2	--	4	3	4
Radar and remote sensing	ECE453	2	2	--	4	3	4
Digital Image processing	ECE441	2	2	--	4	3	4
Microwave Engineering	ECE471	2	2	--	4	3	4
Optical Electronics	ECE472	2	2	--	4	3	4
Satellite communication networks	ECE486	2	2	-	4	3	4
Mobile satellite communication networks	ECE487	2	2	-	4	3	4
Wireless Networks Security	ECE488	2	2	-	4	3	4

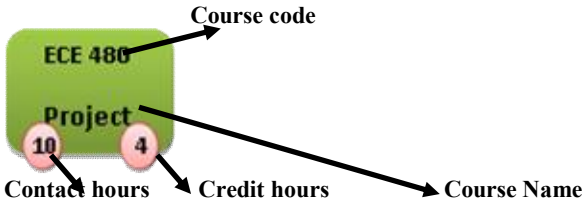
Indicative curricula by subject area (NARS CHARACTERIZATION)

Subject Area	Hours	Subjects	NARS Tolerance
A Humanities and Social Sciences	19	10. 86%	9-12 %
Mathematics and Basic Sciences	39	22.285%	20-26 %
Basic Engineering Sciences	39	22.285%	20-23 %
Applied Engineering and Design	37	21.14%	20-22 %
Computer Applications and ICT	18	10.29%	9-11 %
Projects and Practice	14	8.00%	8-10 %
Subtotal	166	94.86%	92-94 %
Discretionary subjects	9	5.14%	6-8 %
Total	175	100%	

Subject Area	Hours	Subjects
A Humanities and Social Sciences	19	UR041, UR042, UR142, UR143, UR247, UR345, UR347, UR446, UR448
Mathematics and Basic Sciences	39	CR 001, CR 002, CR 003, CR 004, CR 011, CR 013, CR 021, CR 106, CR 107, CR 132, CR 208, CR 209,
Basic Engineering Sciences	39	CR 031, CR 131, ECE161, ECE171, ECE172, ECE261, ECE264, ECE262, ACE272, ECE274,
Applied Engineering and Design	37	ECE090, ECE190, ECE290, ECE263, ECE302, ECE311, ECE375, ECE420, ECE431, ECE384, ECE386, ECE478, ECE***, ECE***
Computer Applications and ICT	18	CSE051, CSE151, CSE251,ECE385, ECE387,ECE365 (Elective)
Projects and Practice	14	CR032,ECE181, ECE281, ECE282, ECE480
Subtotal	166	
Discretionary (Institution character-identifying) subjects	9	ECE***,ECE***,ECE***
Total	175	Compulsory Courses =157Hour Elective Course=18Hour

Courses Tree





Prerequisites of Specialization Elective Courses

List 1

Title	Code	Prerequisite	Code
Microwave Transmission Media	ECE380	Fields and waves	ECE 262
Mobile communication systems	ECE381	Communication System	ECE263
Electronic exchanges	ECE382	Computer eng.	CSE251
TV. and Broadcasting Eng.	ECE383	Fields and Waves	ECE262
Microwave Electronics Eng.	ECE361	Fields and Waves	ECE262
Antenna and wave Prop. Eng.	ECE362	Field and Waves	ECS 262
Satellites Communication systems	ECE363	Digital communication	ECE302
Information and Coding Theory	ECE364	Digital communication	ECE302
Data transfer systems	ECE365	Computer Eng. Information Theory and coding	CSE251 ECE321
Pattern recognition	ECE366	Digital signal Processing	ECE311
Surface acoustic Waves	ECE367	Fields and Waves	ECE262
Networks Routing and switching	ECE374	Network prinicples	ECE387
Wireless sensor networks	ECE368	Network prinicples	ECE387
Wireless sensor networks protocols	ECE369	Network prinicples	ECE387
Wireless sensor networks problems	ECE371	Network prinicples	ECE387
Radio networks planning and optimization	ECE372	Network prinicples	ECE387
Optical networks	ECE373	Network prinicples	ECE387

List 2

Title	Code	Prerequisite	Code
Underwater Acoustics and applications	ECE462	Acoustics and Studio Eng.	ECE431
Radar and remote sensing	ECE453	Field and Waves	ECS 262
Digital Image processing	ECE441	Digital signal Processing	ECE311
Microwave Engineering	ECE471	Field and Waves	ECS 262
Optical Electronics	ECE472	Electronics2	ECE172
Satellite communication networks	ECE486	Computer networks	ECE385
Mobile satellite communication networks	ECE487	Computer networks	ECE385
Wireless Networks Security	ECE488	Computer networks	ECE385

Table for Level 0

First term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Mathematics 1	CR 001	2	2	-	4	3
Physics 1	CR 011	2	2	3	7	4
Eng. Chemistry	CR 021	2	2	3	7	4
Eng. Mechanics 1	CR 003	2	2	-	4	3
Computer Programming 1	CSE051	2	-	3	5	3
English 1	UR 041	1	2	-	3	2
Total		11	10	9	30	19

Second term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Mathematics 2	CR 002	2	2	-	4	3
Physics 2	CR 013	2	2	3	7	4
Eng. Mechanics 2	CR 004	2	2	-	4	3
Engineering drawing using computers	CR 031	1	-	6	7	3
English 2	UR 042	2	2	-	4	3
Mechanical workshop	CR 032	1	-	3	4	2
Total		10	8	12	30	18

Term	code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Summer training1	ECE 090	-	-	3	3	1

Table for Level 1
First term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Eng Mathematics 1	CR 101	2	2	-	4	3
Electronic circuits and components drawing using computerS	CR 131	1	-	6	7	3
Electrical Eng.	ECE161	2	2	-	4	3
Solid state Physics	CR 132	2	2	-	4	3

Electronics 1	ECE171	2	2	3	7	4
Environmental Eng.	UR 142	2		-	2	2
Total		11	8	9	28	19

Second term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Eng. Mathematics 2	CR 107	2	2	-	4	3
Electronics 2	ECE172	2	2	3	7	4
Semiconductor Technology	ECE173	2	2	-	4	3
Electrical Workshop	ECE181	1	-	6	5	3
Computer Programming 2	CSE151	2	-	3	7	3
History of Eng. Science	UR 143	2	-	-	2	2
Total		11	6	12	29	18

Term	code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Summer training2	ECE 190	-	-	3	3	1

Table for Level 2
First term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Signal analysis	CR 209	2	2	-	4	3
Electrical circuits	ECE261	2	2	3	7	4
VLSI Technology	ECE274	2	2	3	7	4
Electrical Power and Machines Eng.	ACE272	2	2	-	4	3
Computer Eng.	CSE251	2	-	3	5	3
Quality assurance standards	UR 247	2	-	-	2	2
Total		12	8	9	29	19

Second term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Electronic Circuits	ECE264	2	2	3	7	4
Fields and waves	ECE262	2	2	-	4	3
Communication Theory	ECE263	2	2	3	7	4
Electronics Workshop	ECE281	1	-	6	7	3
Probability theory and random	CR 208	2	2	-	4	3

variables						
Applied Project	ECE282	1	-	3	4	2
Total		10	8	15	33	20

Term	code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Summer training3	ECE 290	-	-	3	3	1

Table for Level 3
First term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Networking Fundamentals	ECE387	2	-	3	5	3
Digital Communication	ECE302	2	2	3	7	4
Digital Electronics	ECE375	2	2	-	4	3
Elective 1	ECE3**	2	2	-	4	3
Elective 2	ECE3**	2	2	-	4	3
Technical reports writing	UR 347	1	2	-	3	2
Total		11	10	6	27	18

Second term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Digital Signal Processing	ECE311	2	2	-	4	3
Computer Networks	ECE385	2	2	-	4	3
Wireless Networks	ECE386	2	2	-	4	3
Elective 3	ECE3**	2	2	-	4	3
Elective 4	ECE3**	2	2	-	4	3
Human rights	UR 345	2	-	-	2	2
Total		12	10	–	22	16

Table for Level 4
First term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Engineering economics	UR 446	2	-	-	2	2
Networking security Fundamentals	ECE478	2	-	3	5	3
Acoustics and studio Eng.	ECE431	2	2	-	4	3
Elective 5	ECE4**	2	2	-	4	3
Project	ECE480	1	-	3	4	2
Total		9	4	6	19	13

Second term

Title	Code	Lecture	Tutorial	Lab	Contact Hrs	Total credit Hrs
Project management	UR 448	2	-	-	2	2
Optical communication systems	ECE420	2	2	-	4	3
Comm. Network Planning	ECE484	2	2	-	4	3
Elective 6	ECE4**	2	2	-	4	3
Project	ECE480	-	-	6	6	2
Total		8	6	6	20	13.

Courses Contents and Descriptions

1-Level 0

First term

Code	CR 001
Field	College Requirements Eng.
Title	Mathematics 1
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	-
Description	Functions – limits – continuity – differentiation and applications – integration– methods of integration –proper integration- improper integration -Binomial theory- partial fractions

Code	CR 011
Field	College Requirements Eng
Title	Physics 1
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	-
Description	Physical quantities – units and dimensions – field of gravitational force and its application – fluid statics and dynamics – viscosity – elasticity- sound waves – waves in elastic media – heat transfer – Kinetic theory of gases **Practical part:** Determination of sound speed in air – Determination of viscosity using stok's low- Determination of gravitational force - Verfication of stok's law and elasticity constant estimation - Determination hardness coefficient for a wire - Specific heat of the oil had to be a way that electrical Basthaddam priced Gul- The achievement of Boyle's law of gases- Determination of Specific heat of a solid body by mixing - Determination of the coefficient of linear expansion

Code	CR 021
Field	College Requirements Eng
Title	Eng. Chemistry
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	-
Description	State equation –thermodynamic chemistry- material and thermal scale in full burning and chemical process- solvent properties- dynamic stability of chemical and physical

	process- chemical interaction mobility-Electrochemistry- introduction to corrosion engineering - semiconductor chemistry and fabrication. **Practical part:** **Safty guidlines – Density of liquids and solids – compound types – Chemical Reactions – Synthesis of a compound – Empirical formula- Gas Laws – Acids and Bases – Le Chatliere's Principles- molar mass of acid – Titration of Antacids – Titration of Vinegar –colligative properties – calorimtry – kinetics – Beer's Law**

Code	**CR 003**
Field	**College Requirements Eng**
Title	**Eng. Mechanics 1**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	-
Description	**statics- moments- moments of inertia- Newton laws- Vectors and forces in space– particle equilibrium – center of mass and geometrical center- distributed forces-application of hydrostatics – friction and its applications-**

Code	**CSE 051**
Field	**Specialization Requirements**
Title	**Computer programming 1**
Credits	3 Hrs (2 lec + 1Lab)
Prerequisite	**-**
Description	**Techniques of engineering problems- solution in communication engineering- field of information systems- development of planned programs using c++ language- improving, translation, and correction of programs-**

Code	**UR 041**
Field	**University req.**
Title	**English 1**
Credits	2 Hrs (1 lec + 1Tut)
Prerequisite	-
Description	**Chosen compositions in engineering subjects for training on investigating and quick reading- reports writing- information transfer- development of language communication by discussion subjects, and summary writing**

Second term

Code	CR 002
Field	College Requirements Eng
Title	Mathematics 2
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Mathematics 1 CR 001
Description	Integration methods- integration by substitution- successive reduction- triangular substitution- finite integration and its properties –upper and lower rayman collection – basic theory of integration – improper integration – integration application- calculation of rotational areas and volume – integration by approximation – trapezoidal and Simpson rule- Cartesian coordinate and its application – analytical geometry: second order equation – straight line pairs- circle and circle groups – conical sectors – analytical geometry in space – coordinate disciplines- straight line equation

Code	CR 013
Field	College Requirements Eng
Title	Physics 2
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Physics 1 CR 011
Description	Electricity and magnetism: Charge and matter – electric field – Coulomb law- electrical flux- Gauss's law – electric potential – capacitors and dielectrics – current, resistance and electromotive force – magnetic field – Ohm's law and simple circuits- Biot and Savart law – Faraday's law of induction – inductance – magnetic properties of matter – Maxwell's equations – Light: Geometrical optics, wave physics of light and Huggen's principle- interference and diffraction- light polarization and fiber optics. Atomic physics: atomic structure, Boher theory- basic of quantum theory- Laser –electro optics phenomena – reletivity theory **Practical part:** The verifing Ohm's law and Determination the resistivity of the wire – Divergence from Ohm's law and the finding of the relationship between the voltage and current – Determine self inductance of the coil – verifying Ohm's law in a capacitor using alternating current – Metric Bridge – Determination of electrochemical equivalent for Copper – The Determination of horizontal component of magnetic field of the earth - The magnetic field lines for a magnetic rod – Determination of a focal length of convex lens and a concave

	lense using a flat mirror - Determination of the focal length of the concave mirror – Determination of the Refraction coefficient of a liquid

Code	**CR 004**
Field	**College Requirements Eng**
Title	**Eng. Mechanics 2**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**Eng. Mechanics 1 CR 003**
Description	**Engineering dynamics: particle dynamics - Newton's law of motion –equation of motion in different coordinates –work and energy of the particles – conservative groups and potential function – frictions and its applications in linear motion – rigid particle motion- plane motion types and transferable, rotational and general – dynamics of rigid particle**

Code	**CR 031**
Field	**College Requirements Eng**
Title	**Engineering Drawing using Computer**
Credits	3 Hrs (1 lec + 2Lab)
Prerequisite	-
Description	**Principles of engineering drawing – engineering language – analysis and investigation of engineering drawing – projection dimension – free drawing – perspective drawing- threee dimensional modeling – modeling by computer engineering drawing tools – Engineering processes – engineering projection – perspective derivation- derivation of the third view – sectors – steel construction- mechinacl assembling-** **Practical part:** **Using Auto CAD program to do the following:** **Drawing projections - derivation of the third view – Drawing sectors – steel structures – point, lines, and plain projection - Projection Assistant - Multi-Surfaces**

Code	**UR 042**
Field	**College Requirements Eng**
Title	**English2**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**English1 UR 041**
Description	**Analysis and illustration of writing – reading subjects from the several sizes book- concentrated revision for the long**

	writing which include research – experience in subjects presentation -

Code	**CR 032**
Field	**College Requirements Eng**
Title	**Mechanical workshop**
Credits	2 Hrs (1 lec + 1Lab)
Prerequisite	-
Description	**Engineering Materials: Ferrous and non-ferrous metals - Introduction to engineering Instruments - Metal forming and machining - Different methods of joining metals - Introduction to non-conventional machining.** **<u>Practical</u> Part** **Practical exercises in the workshops of: Carpentry, filings and blacksmithing, welding, plumbing and lathe machining**

Code	**ECE090**
Field	**Specialization Requirements**
Title	**Summer Training 1**
Credits	1 Hrs
Prerequisite	-
Description	**Practical training in the faculty in the Mechincal workshop (2 weeks) (Carpentry, filings and blacksmithing , welding, plumbing and lathe machining) and Engineering drawing (2 weeks). For 6Hr. Per day, 4 days per week for 4 weeks,**

2- Level 1
<u>First term</u>

Code	**CR 106**
Field	**College Requirements Eng**
Title	**Eng. Mathematics 1**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**Mathematics 2 CR 002**
Description	**Partial differetiation applications - maximum value of functions in multivariables – vector analysis – vector differential operators – multiple integration and its application (curvature and perpendicular coordinates –**

	Gauss and Stoke's theorem) – infinite series and function expansion – Basic principles of divergence and convergence – ordinary first order differential equations- homogeneous equation- ordinary second order differential equation – constant coefficient equation complementary function and its special solution- Laplace transform and its application in differential equation solution

Code	**CR 131**
Field	**College Requirements Eng**
Title	**Electronic circuits and components drawing using computer**
Credits	3 Hrs (1 lec + 2Lab)
Prerequisite	**Eng. Drawing CR 031**
Description	**Drafting techniques of electronic designs-Symbols of electronic Circuits drafting Assembly and detail drawing-Electronic-Components symbols – Schematic -diagram drawing-Wiring and printed circuit board diagrams-Draw Proper Schematic diagrams of pictorial diagrams-Computer-aided-drawing of electronic Components and circuits-Computer-aided-drawing of printed circuit boards.** **Practical Part:** **Use Agel, Express or Orcad program in carrying out the following:** **Drawing electronic components and symbols - Electronic circuits diagram - printed circuit boards – Drawing of multi-layered circuits**

Code	**ECE 161**
Field	**Specialization Requirements**
Title	**Electrical Eng.**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**Mathematic2 CR 002**
Description	**Electrical circuit constants and variables - Electrical circuit elements – Simple resistance circuit - Electrical circuit analysis – Transformation between electrical sources – Electrical network theories – Delta and star connection and the transformation between them – Steady state sinusoidal AC current circuit – Time vector representation – Power and power factor – Resonance circuit – Inductive coupling Circuit – Three phase circuits.**

Code	CR 132
Field	College Requirements Eng
Title	Solid state physics
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Physics2 CR 013
Description	Atomic structure – Quantum mechanics - principles of crystal structure for solid materials – Energy bands and charge carriers – Carrier concentration and diversion in fields – Concentration of excess carrier in semiconductors- Optical absorption – Carrier interference – Insulating materials – Dielectric constant – Polarization – Piezoelectric – Dielectric losses – Magnetic materials properties – Ferrite materials – Magnetic effects of super conductors

Code	ECE171
Field	Specializatioedn Requirements
Title	Electronics 1
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Physics2 CR 013
Description	Semiconductor physics – Semiconductors – Diffusion current in pn- junction – Biasing of pn- junction – Different types of pn- junctions – Electron ballistics – Semiconductor diodes application – Zener diodes and other elements. **Practical part:** Measuring the properties of the p-n junction and its estimated resistance- properties of Zener diode –Halve wave rectifier – Full wave rectifier – diode limmeter – clipping circuit

Code	CR 142
Field	University Requirements
Title	Environmental Eng.
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	Air pollution and solution- radiation pollution- physical environment and pollution- purification of factories- exhaust gases and energy station's pollution- renewable energy sources- earth thermal energy- mobile telephone technology - environmental noise – Waste recycling

Second term

Code	CR 107
Field	College Requirements Eng
Title	Eng. Mathematics 2
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Eng. Mathematic 1 CR 106
Description	Partial differentiation – Multiple integrals – Infinite series - Subjects in analytical geometry and conic sections – Parametric and polar equations – Fourier series – Fourier transforms – Z- transforms.

Code	ECE172
Field	Specialization Requirements
Title	Electronics 2
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Electronics 1 ECE171
Description	Bipolar Junction Transistor fundamentals - Bipolar Junction Transistor Characteristics - Bipolar transistor Circuits - Small Signal Bipolar Transistor Equivalent Circuit - Single Stage Bipolar Transistor Amplifier – pn- junction Field Effect Transistor – Schottky Field Effect Transistor – Insulated – gate Field Effect Transistor - Field Effect Transistor equivalent circuit and biasing circuit. **Practical part:** Measuring the properties of bipolar transistor - Study methods of connection and transistor biasing - Bipolar Transistor Amplifier – Properties of pn- junction Field Effect Transistor– FET transistor biasing -- Field Effect Transistor amplifier

Code	ECE173
Field	Specialization Requirements
Title	Semiconductor Technology
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Solid state physics CR132
Description	Crystal structure- Energy Band Diagram - Intrinsic carrier densities - Mobility , conductivity , and velocity saturation - diffusion and recombination - General excess carrier movement- Semiconductor under non – equilibrium conditions- Space charge .Wafer preparation. – Epitaxial Deposition. – Lithography and Etching – diffusion – metallization – chip test – junctions.

Code	ECE181
Field	Specialization Requirements
Title	Electrical Workshop
Credits	3 Hrs (1 lec + 2Lab)
Prerequisite	Electrical Eng. ECE161
Description	Safety factor – Measuring instruments and equipments – Defining the experimental components specifications – Skills acquisition in measuring systems – Assembling systems – Designing of printed circuits – Welding methods – Some workshop practical training for analog and electric circuits – Troubleshooting skills in electrical circuits. **Practical part:** Implementation of electrical connections - Technical study of winding transformers- The implementation of some electric circuits - Exercises for measuring transistor -Skills for detecting defects in circuits

Code	CSE151
Field	Specialization Requirements
Title	Computer Programming 2
Credits	3 Hrs (2 lec + 1Lab)
Prerequisite	Computer Programming 1 CSE051
Description	Basics of data structure- Algorithms and data types – Data structure – Scheduling – sorting - graphic- Algorithms (processing, arrangement, searching), all structure and programming are performed using C++ language - Tree analysis and algorithms design - Algorithms efficiency - Complex calculations – Parallel algorithms – Introduction to windows – Windows programming - basics of programming – Training on using one of the visual programming language as an example of windows programming.

Code	UR 143
Field	University Requirements
Title	History of Eng. Sciences
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	History of Engineering Sciences in ancient centuries- Electronics history - Historical developments of Tv. broadcasting- History of transistor and Integrated Circuits invention- Electromagnetic waves discovery by Hertz and Marconi- efforts for radio broadcasting discovery.

Code	ECE 190
Field	Specialization Requirements
Title	Summer Training 2
Credits	1 Hrs
Prerequisite	Summer Training 1 ECE 090
Description	Practical training in the faculty in electrical and Electronics workshops and lab, for 6Hrs. Per day, 4 days per week, for 4 weeks

3- Level 2
First term

Code	CR 208
Field	College Requirements Eng
Title	Probability theory and random variables
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Eng. Mathematics 2 CR 105
Description	Measurements of convergence and divergence- Repetitive distributions- Continuous and discrete distributions - Sampling distributions - Hypothesis – Nonparametric tests- Correlation and non-correlation - Time-domain series analysis.

Code	ECE261
Field	Specialization Requirements
Title	Electrical Circuits
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Electrical Eng. ECE161
Description	Introduction to DC circuit analysis- Circuit theories- Maximum power transfer- Theories of AC analysis- Coupling circuits- Resonance circuits – Non linear circuit analysis. **Practical part:** Realization of Dc circuits – realization of circuit theory - Maximum power transfer- realization of AC circuits analysis- Coupling circuits- Properties of Resonance circuits – Non linear circuit analysis.-

Code	ECE 274
Field	Specialization Requirements
Title	VLSI Technology
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Semiconductor Technology ECE 273
Description	Introduction – MOS transistor theory modeling of transistor using SPICE – fabrication of integreted circuits -Inverter static characteristics - Inverter dynamic characteristics – Combinational MOS logic - Sequential MOS logic circuits - MOS semiconductor Memories - Description component and analysis – Interaction with matter Ion Implementation . **Practical part:** modeling using SPICE for elements, as CMOS, BiCMOS, inverter, NAND, NOR, Counter, Adder

Code	ACE272
Field	Specialization Requirements
Title	Electrical Power and machines Eng.
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Electrical Eng. ECE161
Description	Three phase circuits – Transmission lines – Transmission lines current and voltage relations – Representation of power systems – Transformers – Induction motors (single and three phases) – Direct current machines

Code	CSE251
Field	Specialization Requirements
Title	Computer Eng.
Credits	3 Hrs (2 lec + 1Lab)
Prerequisite	Computer Programming 2 CSE151
Description	Logic design – Logic circuit - Memory elements – Counters – Registers – Analysis and design of combinational digital circuits – Analysis and design of sequential digital circuits- Invention and development of memory elements and processors- Evaluation of computer performance- Memory characteristics and hierarichy– Kinds of memory –Memory managements - Kinds of processors – Order cycle. **Practical part:** Realization of logic design for different circuits – realization of flip flop cicuits – realization of register – Realization of counter – realization for different sequential circuits

Code	UR 247
Field	University Requirements
Title	Quality assurance standards
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	Decision analysis- Linear programming- New methods for quality adaptation and improvement in the industrial services- General frame for overall quality system operation in relation with quality-quantity Functions and limits.

Second term

Code	ECE264
Field	Specialization Requirements
Title	Electronic Circuits
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	Electrical circuit ECE261 - Electronics2 ECE172
Description	Multi stages amplifier – Feed back amplifier oscillators – Power amplifier- High frequency amplifiers - Integrated Circuit amplifiers – Wide band amplifier- Operational Amplifiers characteristics- Wave generation and shaping- Application of non-linear circuits- Design of analog electronic circuits- Circuit simulation- Response description and printed circuit building. **Practical part:** Characteristics of multi stage amplifier – Gain measurements – coupling - Characteristics of feedback amplifier – Oscillator characteristics – Power amplifier – High frequency amplifiers – IC amplifiers

Code	ECE 262
Field	Specialization Requirements
Title	Fields and waves
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Electrical circuit ECE261 - Physics2 CR013
Description	Electrostatic Fields- Electric flux and gauss's law- Electrical Potential – Electric boundary conditions – Dipole moment – Capacitance- Poisson and Laplace equations – Piot & savart law- Amperes law- Vector potentials- Magnetic boundary conditions- Magnetic flux – Force and energy in magnetic field- Coils – Time varying field- Maxwell's equations- Wave

	propagation – Introduction to transmission line theory- Propagation in losses and lossless media- Reflection and refraction.

Code	**ECE 263**
Field	**Specialization Requirements**
Title	**Communication Theory**
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	**Signal Analysis CR-209**
Description	**Introduction to Communication Systems- Energy spectral density analysis – Amplitude modulation suppressed carrier and its de-modulation - Amplitude modulation with carrier- its de-modulation – Single side band suppressed carrier its de-modulation - Vestigial side band its de-modulation – Narrow band frequency modulation and demodulation- wide-band frequency modulation and demodulation- Phase modulation- Frequency and amplitude modulation receiving systems- Frequency division multiplexing- Noise in analog modulation systems.** **Practical part:** **Amplitude modulation – Modulation depth measurements – single side band and double side band – Methods of detection of amplitude modulation – Peak detector – rectifier detector – frequency modulators – Detection of frequency modulation**

Code	**ECE 281**
Field	**Specialization Requirements**
Title	**Electronics Workshop**
Credits	3 Hrs (1 lec + 2Lab)
Prerequisite	**Electrical circuit ECE261 Eelectronics2 ECE172**
Description	**Electronic Components –Measurements of electronic quantities- Feed back circuits- Operational amplifier circuits- Oscillator circuits- Wave generation circuits.** **Practical part:** Realization of paricticaI circuits –layout – printed circuits

Code	**CR 209**
Field	**College Requirements Eng**
Title	**Signal Analysis**
Credits	3 Hrs (2 lec + 1Tut)

Prerequisite	**Eng. Mathematics 2 CR 105**
Description	**Analogue signal Analysis – Power spectrum- Energy spectrum signal presentation in time and frequency domain- Signals and systems- Signals presentation - Sampling- Constant linear system response- Frequency response- Discrete signals – Z-transform and inverse Z-transform- Non-continuous Fourier transform- Random process- Convolution and correlation- Spectrum transform.**

Code	**ECE 282**
Field	**Specialization Requirements**
Title	**Applied Project**
Credits	2 Hrs (2 lec + 1Lab)
Prerequisite	-
Description	**A major independent project under the supervision of a staff member; to enable the student to understand and apply the knowledge gained throughout his coursework to an engineering problem at large scale.**

Code	**ECE 290**
Field	**Specialization Requirements**
Title	**Summer Training 3**
Credits	1 Hrs
Prerequisite	**Summer Training 2 ECE 190**
Description	**External training for 4 weeks in the work positions, factories and originations**

4- Level 3

First: Compulsory courses

First term

Code	**ECE 387**
Field	**Specialization Requirements**
Title	**Networking Fundamentals**
Credits	3Hrs (2 lec + 1Lab)
Prerequisite	**Computer Engineering CSE251**
Description	**Networking concepts and network Types : LAN, MAN, and WAN, Network elements and topologies, requirements, architectures, services, Multiplexing: Types and Hierarchies, Transmission Media Characteristics and Measurements, Network Life Cycle: Installation and commissioning - Service characterization - Operations, administration, and Maintenance, Network Signaling : Function and procedures, Network traffic Management: Traffic flow and congestion control, Network Protocols: Definition - functions - standards**

	- analysis , OSI Model, Narrow, Wide and Broadband Communication networks, Network Performance Criteria and metrics: Reliability - Availability – Quality of service - Grade of service - throughput - Error rate, Practical part: **Exploring the network – Configuring a network operating system – Network protocols and communications- Network access – ethernet – network layer - IP subnetting IP network -application layer**

Code	**ECE 302**
Field	**Specialization Requirements**
Title	**Digital Communication**
Credits	4 Hrs (2 lec + 1Tut + 1Lab)
Prerequisite	**Communication Theory ECE263**
Description	**Introduction-The Sampling theory - Digital Transmission systems- Digital Modulation systems -Data Communication systems -Performance of digital communication systems in the presence of noise. Advanced topics in digital communication- Intersymbole interference- In band limited channels- Equalization- Multi-carrier modulation.** **Practical part:** **Digittal signal genertator - Clock signal generating circuit - Pseudo-random code circuit - NRZ code circuit - Anologe signal source - Synchronized Sine-wave Generator - A Synchronized Sine-wave Generator –Voltage controled oscillator (VCO) – Digital frequency synthesis - FSK (Frequency shift keying) Signal generation - FSK Signal asynchronous detection FSK Signal synchronous detection - PSK (Phase shift keying) signal generation - PSK Signal synchronous detection - ASK (Amplitude shift keying) signal generation - ASK Signal asynchronous detection - Frame synchronization extracting – Code pattern changeover .**

Code	**ECE 375**
Field	**Specialization Requirements**
Title	**Digital Electronics**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**Computer Eng. CSE251**
Description	**Introduction- gates and counter design- register design – design of IC using CAD- design flow- design verifications-IC selections- matrix of programming logic units- CMOS circuits.**

Code	CR 344
Field	University Requirements
Title	Technical report writing
Credits	2 Hrs (1 lec + 1Tut)
Prerequisite	Language 2 UR 042
Description	Definition of Eng writing- identification of received students-eng. Writing process- Research- summary- page design-reports- web site design- comments- suggestion-user manual-oral report

Second term

Code	ECE 311
Field	Specialization Requirements
Title	Digital Signal Processing
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Signal Analysis CR209
Description	Signal analysis – Discrete fourier transform algorithm – Fast fourier transform – Random process – Digital filter design - Digital filter realization – Word length effect- Wiener filter- Adaptive filters- Signal coding and compression- Signal recovering application.

Code	ECE 385
Field	Specialization Requirements
Title	Computer Networks
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	Computer Eng. CSE 251
Description	Overview of Computer Networks-Data transmission-LAN Topology--LAN Protocols-OSI Protocol-Internet-Network Security-ISDN-ATM Network

Code	ECE 386
Field	Specialization Requirements
Title	Wireless Networks
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Computer Eng. CSE 251
Description	Wireless local area networks – Wireless local loops- wireless asynchronous transmission modes networks- wireless network protocols – Security in wireless networks and its challenges – wireless networks links – Multi-layers wireless networks – Cogintive radio network

Code	UR 345
Field	University Requirements
Title	Human Rights
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	General view on human rights from the point of view of international laws- The Islamic legislation and human rights- the human rights resources and its public freedom in Europe and Egypt- the human rights in suitable environment.

Second: Elective Courses

Code	ECE 380
Field	Specialization Requirements
Title	Microwave transmission media
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Fields and waves ECE 262
Description	Treatment of microwave network using static theory- Impedance transformation and microwave filter- microwave components – Filter design – performance of microwave amplifier

Code	ECE 381
Field	Specialization Requirements
Title	Mobile Communication Systems
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Communication System ECE263
Description	Fundamentals of Mobile Radio –(Cellular Structure- Mobile Radio Network Structure- Channel Allocation Techniques) - Mobile Radio Propagation Channel characteristics - Diversity and Combining Techniques - System Capacity Analysis -Digital Cellular Mobile Radio system -Modulation Techniques- Multiple Access Techniques -Operating Systems-3rd – Generation Systems -safety Aspects

Code	ECE 382
Field	Specialization Requirements
Title	Electronics Exchange
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Computer eng. CSE251

Description	**Introduction to networks- switching matrix system- central control exchange- registeration control exchange- Flow chart of call establishment between exchange- Subscriber matching unit- Trouble shooting – Faxmile systems.**

Code	**ECE 383**
Field	**Specialization Requirements**
Title	**Tv. And Broadcasting Eng.**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Fields and Waves ECE262**
Description	**Design of wireless circuit for amplification and in high frequency range to compensate for signal processing and antennas communications- Tv. Systems designe of transmitting and receiving circuits in radio wave using the methods of propagation parameters includes oscillator circuits- frequency amplifier- matching networks- mixer and detectors- methods of television transmission**.

Code	**ECE 361**
Field	**Specialization Requirements**
Title	**Microwave Electronics Eng.**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Fields and Waves ECE262**
Description	**Microwave Tubes- Solid State Amplifiers-Parametric Amplifiers-Oscillators and Mixers -microwave filterS- source and detectors- measurements technology**

Code	**ECE 362**
Field	**Specialization Requirements**
Title	**Antenna and Wave Propagation Eng.**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Field and Waves ECS 262**
Description	**Introduction – Antenna parameters – Radiation Patterns – Gain – Beamwidth – Antenna impedance – Radiation resistance – Infinit dipole short dipole – Halve-wave dipole – Loop antenna- antenna arrays – Two element array – Linear arrays - Microstrip Antennas-Smart Antenna -**

Code	**ECE 363**
Field	**Specialization Requirements**
Title	**Satellite Communication Systems**

Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Digital communication ECE302**
Description	**Introduction-Satellite Systems-Satellite Links-Satellite Orbits -Modulation Techniques in Satellite Communication Systems- Multiple Access Techniques-Satellite Systems Applications**

Code	**ECE 364**
Field	**Specialization Requirements**
Title	**Information and Coding Theory**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Digital communication ECE302**
Description	**mathematical measures for sources and channels. Introduction to rate distortion theory. Channel capacity, source and channel coding theorems -Randomness principle Basic problems in coding theory- Distance measurements – Limits of code performance – Important types of wrong codes- structure and characteristics of finite fields – Cyclic codes – BCH and Solomon codes – correcting errors in BCH and Solomon codes.**

Code	**ECE 365**
Field	**Specialization Requirements**
Title	**Data Transfer System**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Computer Eng. CSE251 Information Theory ECE321**
Description	**Systems of Data Transfer – system elements- source-modulation systems and filters- equalization- convolution code- MAP algorithm – PCM- Turbo code- ADSL systems**

Code	**ECE 366**
Field	**Specialization Requirements**
Title	**Pattern Recognition**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Digital signal Processing ECE311**
Description	**Introduction- Basic concepts in Pattern Recognition- design functions and theorems- classifiers- classifications theorems-classifications using statistical approach-feature selection-neural networks and pattern classifications – character Recognition.**

Code	**ECE 367**
Field	**Specialization Requirements**
Title	**Surface Acoustic Waves**

Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Field and Waves ECS 262**
Description	**Principles of SAW – linear phase SAW filter design-Saw filter equivalent circuit- Saw filter Matching- slanted finger SAW filter- SAW filter application in Mobile-**

Code	**ECE 374**
Field	**Specialization Requirements**
Title	**Networks Routing and switching**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Network prinicples ECE387**
Description	**OSI Seven-Layer Model, Routing and Flow Control - Connection-Oriented and Connectionless Protocols, Switching Concepts and Basic Requirements, Switching techniques: Circuit, Message, Packet and Optical switching, Basics of data switching and transmission, Traffic Analysis, Switching Dimensioning and Efficiency, Hierarchical Routing and Protocols, Static /Adaptive routing Strategies, Interference, Bandwidth, multipath - aware routing, Secure routing protocols : concepts - Classification - design, Routing metrics. Introduction to switching network – Basic switching network and configuration – VLANs – Routing concepts – Inter-VLAN routing – static routing – single area 0SPF – Access control lists – DHCO – Network address transalation for Ipv4**

Code	**ECE 368**
Field	**Specialization Requirements**
Title	**Wirless sensor networks**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Network prinicples ECE387**
Description	**Introduction and overview of wirless sensor networks – basic overview of the technology – application of wirless sensor networks – Basic wireless sensor technology – Wirless transmission technology and system**

Code	**ECE 369**
Field	**Specialization Requirements**
Title	**Wirless sensor network protocols**
Credits	3Hrs (2 lec + 1Tut)

Prerequisite	**Network prinicples ECE387**
Description	**Introduction – Medium access control protocols for wirless sensor network - Routing protocols for wirless sensor networks - Transport controls for wirless sensor network**

Code	**ECE 371**
Field	**Specialization Requirements**
Title	**Wirless sensor network – Problems**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Network prinicples ECE387**
Description	**Introduction – Radio frequency technologies for wirless sensor network – Network aspects and deployment in wirless sensor networks - Standard and safety regulations for wirless sensor network**

Code	**ECE 372**
Field	**Specialization Requirements**
Title	**Radio Network Planning and Optimization**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Network prinicples ECE387**
Description	**Review of Cellular networks - WCDMA Radio Network Planning - Radio Resource Utilization - Coverage and Capacity Enhancement Methods - Radio Network - Optimization Process UMTS Quality of Service - Advanced Analysis for Cellular Networks -Automatic Optimization - 3G Radio Access Technologies**

Code	**ECE 373**
Field	**Specialization Requirements**
Title	**Optical network**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Network prinicples ECE387**
Description	**Optical Switching - Technology and architecture – Burst Assembly - Signaling – Contention resoulation – Channel scheduling - Quality of service of fiberless Optical network – Timer and Threshold Selection:**

5- Level 4
First: Compulsory courses

First term

Code	UR 446
Field	University Requirements
Title	Engineering Economics
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	Introduction to economics- Demand and presentation of contents – costs – time value for money – money transfer- compression among substitutes- economic benefit- economic analysis of projects in the general work section – functional coding.

Code	ECE 478
Field	Specialization Requirements
Title	Network security Fundamentals
Credits	3Hrs (2 lec + 1Lab)
Prerequisite	Networking Fundamentals ECE 387
Description	Basics of Security : Security History- Policy - modes - issues - parameters - architecture, Ciphering , and Authentication, Information privacy, Authorization, Encryption, Information security: System level - Protocol level, Encryption principles : Speech and Data, Encryption Techniques: Symmetric / Asymmetric, Security Threats : Inside / Outside, Security Attacks : Passive / Active, Attack Recognition, Hacking and Hackers - The Hacking Process, Security Services and Mechanisms and their Relationship. Adaptive Security and Robust Networks **Practical Part** Introduction to switching networks – Basic switching network and configuration – VLANs – Routing concepts – Inter-VLAN routing – static routing – single area OSPF – Access control lists – DHCO – Network address transalation for ipv4

Code	ECE 431
Field	Specialization Requirements

Title	**Acoustic and Studio Eng.**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Fields and Waves ECE262 + Physics2 CR 013**
Description	**Vibrations and Waves-The Acoustic Wave Equations-Transmission Phenomena-Radiation and Reception of Acoustic Waves-Ultrasonic Transducers-Loudspeakers-Microphones-Room Acoustics.**

Second term

Code	**UR 448**
Field	**University Requirements**
Title	**Projects management**
Credits	2 Hrs (2 lec)
Prerequisite	-
Description	**Fundamental definitions and illustrating skills for the influencing descions in projects management- planning and organization of a project in variable and complex work environments throughout technology tools- Typical examples that join theoretical and practical study cases**

Code	**ECE 420**
Field	**Specialization Requirements**
Title	**Optical Communication Systems**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Communication Theory ECE263**
Description	**Introduction – optical fiber wave guides. – Transmission characteristics of optical fiber wave guide - optical sources – Laser diodes- Light emitting diodes- fabrication of optical fiber – connectors , splices and coupler**

Code	**ECE 484**
Field	**Specialization Requirements**
Title	**Communication Network Planning**
Credits	3 Hrs (2 lec + 1Tut)
Prerequisite	**Probability Theory and Random variables CR208**
Description	**Goal of Network Planning-Fundamental Plans-Financial Plan-Provision Timing Plan-Technical Plan -Forecasting Plan -Switching Plan -Numbering Plan -Routing Plan-Signaling Plan -Charging Plan-Evaluation and Development Plan -Transmission plan -Quality of Service -Grade of Service-Mobile Radio Network- Satellite Network.**

Code	ECE 480
Field	Specialization Requirements
Title	Graduation Project
Credits	4 Hrs (1 lec + 3 Lab)
Prerequisite	140 Credits
Description	A major independent project under the supervision of a staff member; to enable the student to understand and apply the knowledge gained throughout his coursework to an engineering problem at large scale- at the end of the project, the student should submit a report

Second: Elective Courses

Code	ECE 462
Field	Specialization Requirements
Title	Underwater Acoustics and Applications
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Acoustics and Studio Eng. ECE431
Description	Sonar transmission fundamentals- modulation systems in Sonar- Sonar electronics- scanning-Media transmission- Sonar equations- Target intensity- Reflection loss coefficient – Spectrum analysis of sonar signal- Ray trace – Modeling of sonar- Under-water transducer.

Code	ECE 453
Field	Specialization Requirements
Title	Radar and Remote Sensing
Credits	3Hrs
Prerequisite	Fields and waves ECE262
Description	Rader fundamentals- Radar transmission and reception- radar targets- types of radar systems and its applications. Moving-Object Tracking Radar Remote sensing and navigations

Code	ECE 441
Field	Specialization Requirements
Title	Digital Image Processing
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Digital signal Processing ECE311
Description	Two-dimensional signals fundamental. Image sampling and quantization. Image Transforms: 2-D filter design. Image enhancement – Image reconstruction – Adaptive image processing. Application of digital image processing.

Code	ECE 471
Field	Specialization Requirements
Title	Microwave Engineering
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Fields and waves ECE262
Description	Introduction- Maxwell equations – electromagnetic boundary conductions- Parallel conducting planes – Rectangular waveguide – TE and TM waves– Excitation of modes- Power flow- Attenuation- Waveguide impedance- Circular waveguide- Dielectric waveguide- Cavity resonator.

Code	ECE 472
Field	Specialization Requirements
Title	Optical Electronics
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Electronics 2 ECE172
Description	Introduction – Laser Oscillation- Light sources and LEDs- Light Detectors- Electro-optical modulators- Magneto-optical modulator- Traveling wave electro-optical modulators

Code	ECE 486
Field	Specialization Requirements
Title	Satellite Communication Network
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Computer networks ECE385
Description	Evolution of Satellite Technology and Applications - Satellite Links, Multiple Access Methods, and Frequency Bands - Space Segment and Satellite Implementation - Broadcast and Multicast Links to Multiple Users - Television Applications and Standards - Digital Video Compression Systems and Standards - Direct-to-Home Satellite Television Broadcasting - Satellite Digital Audio Radio Services

Code	ECE 487
Field	Specialization Requirements
Title	Mobile Satellite Communication Networks
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	Computer networks ECE385

Description	**Mobile Communication System Evolution - Mobile Satellite Systems - Constellation Characteristics and Orbital parameters - Communications with LEO Satellites - Application of CDMA in LEO Satellite Systems Channel Characteristics - Radio Link Design - Integrated Terrestrial-Satellite Mobile Networks - Market Analysis**

Code	**ECE 488**
Field	**Specialization Requirements**
Title	**Security of Wireless networks**
Credits	3Hrs (2 lec + 1Tut)
Prerequisite	**Computer networks ECE385**
Description	**Goals of Information Security - Risks and Threats of Wireless networks - Wireless Security Policy and Protocols - Wireless Security Architectures - Wireless Threat Modeling - Wireless LAN Security - Breaking Wireless Security - Topological Vulnerability Analysis - Active Worm Defense - Prevention of Information Attacks - Intrusion Detection Information Systems Security Management**