College of Engineering

King Khalid University

Bachelor of Science (BSc.) in Electrical Engineering

Program Study Plan
(Distribution of Courses over Different Levels)

Table of Contents

Course Code	Course Title	Weekly Distribution of Credit Hours				Prerequisites	Co-requisites
		Lectures	Lab	Credit Hours	Contact Hour		
First Year - First Level							
013-ENG-9	Intensive English Program-1	0	9	9	18	--	--
107-CHEM-6	General Chemistry	5	1	6	7	--	--
111-GE-4	Engineering Drawing -1	0	4	4	8	--	--
Total Number of Hours		**5**	**14**	**19**	**33**		
First Year – Second Level							
119-MATH-5	Differentiation And Integration -1	5	0	5	5		
111-IC1-3	The Entrance to the Islamic Culture	3	0	3	3		
014-ENG-9	Intensive English Program 2	0	9	9	18	013-ENG-9	
Total Number of Hours		**8**	**9**	**17**	**26**		
First Year – Third Level							
129-MATH-5	Algebra and Geometry	5	0	5	5		
129-PHYS-6	Physics -1	5	1	6	7		
101-CS-5	Computer Science	4	1	5	6		
Total Number of Hours		**14**	**2**	**16**	**18**		
Second Year – Fourth Level							
211-ME-6	Engineering Mechanics	5	1	6	7		
219-MATH-5	Differentiation And Integration -2	5	0	5	5	119-MATH-5	
219-PHYS-5	Physics -2	4	1	5	6	129-PHYS-6	
Total Number of Hours		**14**	**2**	**16**	**18**		
Second Year – Fifth Level							
121-ME-4	Production Technology and Workshop	1	3	4	7	111-GE-4	
211-EE-5	Electric Circuits -1	4	1	5	6	129-PHYS-5 119-MATH-5 129-PHYS-6	
112-IC1-3	Islamic Culture -2	3	0	3	3		
229-MATH-5	Differentiation And Integration -3	5	0	5	5	219-MATH-5	
Total Number of Hours		**13**	4	17	**21**		
Second Year – Sixth Level							
228-ME-5	Thermal Dynamics and Hydraulics	4	1	5	6	219-MATH-5 129-PHYS-6	
221-EE-4	Electric Circuits -2	3	1	4	5	211-EE-5	
222-EE-4	Electric Measurements	3	1	4	5	211-EE-5	
223-EE-4	Electronic Engineering	3	1	4	5	211-EE-5 219-MATH-5	
Total Number of Hours		**13**	4	17	21		
Third Year–Seventh Level							
311-EE-4	Electromagnetic Fields	3	1	4	5	211-EE-5 219-MATH-5	
113-IC1-3	Islamic Culture -3	3	0	3	3		
319-MATH-5	Differential Equations	5	0	5	5	219-MATH-5	
313-EE-4	Energy Conversion	3	1	4	5	221-EE-4	
Total Number of Hours		**14**	**2**	**16**	**18**		
Third Year– Eighth Level							
312-EE-4	Logic Circuits	3	1	4	5	211-EE-5	

314-EE-1	Electric Testing -1	0	1	1	2	221-EE-4 223-EE-4	
301-NGL-3	Technical Reports Writing	3	0	3	3	014-ENG-9	
329-MATH-3	Principles of Complex Variables and Special Functions	3	0	3	3	319-MATH-5	
329-STAT-3	Principles of Statistics and Probabilities	3	0	3	3		
Total Number of Hours		**12**	**2**	**14**	**16**		
Third Year –**Ninth Level**							
322-EE-4	Signal Processing	3	1	4	5	219-MATH-5 319-MATH-5	
321-EE-1	Electric Testing -2	0	1	1	2	312-EE-4 313-EE-4	
323-EE-4	Electronic Circuits -1	3	1	4	5	223-EE-4	
324-EE-4	Computerized Methods for Engineering	3	1	4	5	101-CS-5 319-MATH-5	
Total Number of Hours		**9**	**4**	**13**	**17**		
Summer Internship							
400-EE-0	Summer Internship	**0**	**0**	**0**	**0**	Completion of 136 credit hours	
Fourth Year–Tenth Level							
201-ARAB-3	Arabic Language Skills	3	0	3	3		
412-EE-4	Automatic Control	3	1	4	5	221-EE-4 319-MATH-5	
411-EE-4	Principles of Electric Machines	3	1	4	5	313-EE-4	
424-IE-3	Engineering Economy	3	0	3	3		
Total Number of Hours		**12**	**2**	**14**	**16**		
Fourth Year –Eleventh Level							
413-EE-4	Communication Systems	3	1	4	5	322-EE-4 329-MATH-3	
114-IC1-3	Islamic Culture -4	3	0	3	3		
414-EE-4	Computer Organization -1	3	1	4	5	312-EE-4 329-MATH-3	
422-EE-4	Electronic Circuits -2	3	1	4	5	323-EE-4	
Total Number of Hours		**12**	**3**	**15**	**18**		
Fourth Year –Twelfth Level							
421-EE-4	High Voltage Engineering	3	1	4	5	221-EE-4	
422-IE-3	Environment Engineering	3	0	3	3		
423-EE-1	Electric Testing -3	0	1	1	2	411-EE-4 412-EE-4	
424-EE-4	Computer Organization -2	3	1	4	5	414-EE-4	
425-EE-4	Electric Power Systems	3	1	4	5	313-EE-4	
Total Number of Hours		**12**	**4**	**16**	**20**		
Fifth Year–Thirteenth Level							
202-ARAB-3	Arabic Editing	3	0	3	3		
511-EE-1	Electric Testing -4	0	1	1	2	413-EE-4 424-EE-4	
512-EE-4	Integrated Circuits	3	1	4	5	422-EE-4	
513-EE-4	Microprocessor Based Systems	3	1	4	5	414-EE-4	
591-EE-4	Graduation Project	4	0	4	4	Passing 180 credit hours It continues for the next trimester	
Total Number of Hours		**13**	**3**	**16**	**19**		

Fifth Year–Fourteenth Level							
514-EE-4	Power Electronics	3	1	4	5	221-EE-4 223-EE-4	
515-EE-1	Electric Testing- 5	0	1	1	2	421-EE-4 425-EE-4	
521-EE-4	Operating Systems	3	1	4	5	424-EE-4	
522-EE-4	Electric Power System Analysis	3	1	4	5	425-EE-4	
Total Number of Hours		**9**	**4**	**13**	**17**		
Fifth Year–Fifteenth Level							
523-EE-4	Advanced Communication Systems	3	1	4	5	413-EE-4	
524-EE-4	Software Engineering	3	1	4	5	414-EE-4	
525-EE-1	Electric Testing (6)	0	1	1	2	422-EE-4 424-EE-4	
514-IE-3	Industrial Project Management	3	0	3	3		
Total Number of Hours		**9**	**3**	**12**	**15**		

Descriptions of BSc. Electrical Engineering Courses

Electrical Engineering Courses

Course Title	**Electric Circuits-2**	**Coordinator**			
Course Code	221-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	211-EE-5	**Level/Year**		**6/2**	

Course Objective:

- The main purpose of this course is to teach the students the design and analysis of electric circuits.
- To understand the relation between three phase variables and to analyze three phase circuits.
- To understand, how to analyze mutually coupled circuits.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To understand knowledge of societal, health, safety, legal management, sustainability and cultural issues and the consequent responsibility reverent to Electrical Engineering
- An ability to design and conduct experiments, analyze and interpret data
- The ability to function on multidisciplinary teams

Course Contents:	
Unit 1:	Transient behavior of electrical circuits
Unit II :	Transient analysis of RL and RC circuits. Transient analysis of RLC series and parallel circuits. Three phase circuits
Unit III:	Mutually coupled circuits
Unit IV:	Series and parallel resonance,First order filters,
Unit V :	Two Ports Networks

Text Book (s):

- Alexandar, Mathew," Fundamentals of electric circuits", 4th Edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	**Electric Measurements**	**Coordinator**			
Course Code	222-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	211-EE-5	**Level/Year**		**6/2**	

Course Objective:

- Awareness for the importance of understanding and selection of the suitable measurement instruments in the electrical sites**.**
- Ability to work independently and as part of a team

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE
- An ability to design a system, component or process to meet desired needs within realistic constraints.
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Classification of measurement methods Definitions of Measurement:
Unit II :	The DC instruments PMMC
Unit III:	The Rectification instruments: Ammeter – Voltmeter The Rectification circuits and analysis
Unit IV:	Theory of the AC instruments The Electrodynamometer wattmeter – errors
Unit V :	The Bridge measurements The CRO (construction and operation)

Text Book (s):

- Modern Electronic Instrumentation and Measurement Techniques.", by A D Helfrick & W D Cooper, Prentice Hall International

Reference Book (s):

- A.K.Sawhney, (1985), "Electrical and Electronic Measurements and instrumentation",Dhanpat Rai & Sons

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	**Electronic Engineering**	**Coordinator**			
Course Code	223-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	211-EE-5, 219-MATH-5	**Level/Year**		**6/2**	

Course Objective:

- To inculcate in students with the basic working principle of different electronic devices and their applications in the modern electronic systems.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- The broad education necessary to understand the impact of nengineering solutions in a global, economic, environmental and societal context.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	SEMICONDUCTOR BASICS - Atomic structure - Conductors, Semiconductors and insulators - N-type, P-type Semiconductors
Unit II :	DIODES - Diode V-I Characteristic Carve - Diode Models, Diode testing - DIODE APPLICATIONS - Half wave Rectifier & Bridge Rectifier - Filters, Limiters, Voltage Regulators
Unit III:	SPECIAL –PURPOSE DIODES - Zener diodes - Varacter Diodes - Other Types
Unit IV:	BJT - The transistor as an amplifier - The transistor as a switch
Unit V :	TRANSISTOR BAIS CIRCUITS - DC operating point - Voltage divider bias - Common emitter bias

Text Book (s):

- Electronic Devices (Electron Flow Version), 9th Edition by Thomas L. Floyd

Mode of Evaluation:

- Mid-Term Tests ……. …….……..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	Electromagnetic Fields	Coordinator			
Course Code	311-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	219-MATH-5, 211-EE-5	Level/Year		7/3	

Course Objective:

- To inculcate in students with different aspects of Electromagnetic fields and its applications in modern world communication systems.
- By the end of the course, the student should be familiar with the following topics:

Vector

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE

Course Contents:	
Unit 1:	Vector Algebra, Co-ordinate Systems and Transformations,
Unit II :	Vector Calculus, Electrostatic Fields
Unit III:	Electric Fields in Material Space, Magnetostatic Fields
Unit IV:	Magnetic Forces, Materials and Devices.
Unit V :	Applications of Electromagnetic Fields.

Text Book (s):

- Elements of Electromagnetics, By Matthew N. O. Sadiku, Oxford University Press

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Logic Circuits	Coordinator			
Course Code	312-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	211-EE-5	Level/Year		8/3	

Course Objective:

- Understand the basic theorems for logic circuits, principles of operations and their models.
- Analysis of numerical conversion methods and different applications for logic circuits.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE.
- An ability to apply Knowledge of mathematics, science and engineering.
- Recognition of the need for and an ability to engage in lifelong learning

Course Contents:	
Unit 1:	Review on number systems Switching function
Unit II :	Design using NAND and NOR gates Storage devices Sequential circuits
Unit III:	Adders Subtractors Decoders
Unit IV:	Coders Multiplexer/de-multiplexer Memories (ROM,PLA, RAM).
Unit V :	Introduction to microprocessors.

Text Book (s):

- Moris,"Digital Design", Prentice Hall, most recent editionSpecific course information

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	**Energy Conversion**	**Coordinator**			
Course Code	313-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	221-EE-4	**Level/Year**		**7/3**	

Course Objective:

- Classify the types of energy sources.
- Define the different components of electromechanical energy converters.
- Mention the main basis of energy conversion

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To understand knowledge of societal, health, safety, legal management, sustainability and cultural issues and the consequent responsibility reverent to Electrical Engineering
- An ability to design and conduct experiments, analyze and interpret data
- The ability to function on multidisciplinary teams

Course Contents:	
Unit 1:	Introduction – Magnetic circuit- Flux, flux density Introduction to electromechanical energy conversion, energy sources, energy, co-energy, storage energy.
Unit II :	Introduction To Rotating Machines - AC And DC Machines Elementary Concepts multi-excited system
Unit III:	Introduction To AC And DC Machines MMF Of Distribution Winding Generated Voltage Torque In Non-Salient Pole Machines-MMF Of Distribution Winding
Unit IV:	Rotating MMF Waves In AC Machines Renewable Energy
Unit V :	Solar Energy- solar cell Wind Energy

Text Book (s):

- Electric Machinery by fitzgerald

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Signal Processing	Coordinator			
Course Code	322-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	319-MATH-5, 219-MATH-5	Level/Year		9/3	

Course Objective:

- To understand the scenario of the telecommunication technique.
- To classify signals and systems.
- To understand the benefits of signals‟ operation.
- To learn to implement the important signals, and the reasons behind their importance.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Continuous time (CT) and discrete-time (DT) signals, Basic system properties. Linear time-invariant (LTI) systems Discrete-time LTI systems
Unit II :	The convolution sum, Continuous-time LTI systems Properties of LTI systems.
Unit III:	Fourier series representation of periodic signals. Fourier series representation of discrete Signals.
Unit IV:	The properties of continuous-time Fourier transform. The discrete-time & Continuous-time Fourier transform
Unit V :	The Z-transform: Region of convergence, The Inverse Z-transform, Properties of the Z-transform.

Text Book (s):

- Oppenheim, Willsky, and Nawab, “Signal and Systems”, Prentice Hall, most recent edition
- Edward W. Kamen and Bonnie S. Heck, Fundamentals of Signals and Systems, using the WEB and Matlab, Pearson Prentice Hall, Inc., New Jersey, 3rd Edition, 2007

Reference Book (s):

- Haykin, and Veen, “Signal and Systems”, John Wiley, most recent edition.
- Ifeachor Jervis, “Digital Signal Processing”, A practical approach, Pearson Prentice Hall, Inc., 2nd Edition.
- Proakis, Digital Communication, McGraw Hill, Inc., 4th Edition.

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Electronic Circuits-1	Coordinator			
Course Code	323-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	223-EE-4	Level/Year		9/3	

Course Objective:

- The main purpose of this course is to teach the students the design and analysis of electronic amplifier circuits

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- The broad education necessary to understand the impact of nengineering solutions in a global, economic, environmental and societal context.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Amplifier operation, Transistor AC equivalent circuits BJT Amplifiers Common-Emitter, Common-base, Common-Collector Darlington pair Multistage Amplifier
Unit II :	FETs JFET Characteristics and Parameters JFET Biasing Techniques & Stability The MOSFET Transistors Characteristics and Parameters
Unit III:	FET Amplifiers: Common Source, Common Drain,Common-Gate
Unit IV:	Power Amplifiers Class A & B Power Amplifiers Power Amplifiers
Unit V :	Class AB Push-Pull Amplifier Amplifiers Frequency Response Low frequency Response High frequency Response

Text Book (s):

- Electronic Devices , 2nd edition, Thomas Floyd, Pearson

Mode of Evaluation:

- Mid-Term Tests ……. ……..…..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	Computerized Methods for Engineering	Coordinator			
Course Code	324-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	319-MATH-5, 101-CS-5	Level/Year		9/3	

Course Objective:

- The course in intended to develop an understanding and ability of the implementation of mathematical techniques on a digital computer.
- Memorize syntax of Matlab commands.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.

To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE

Course Contents:	
Unit 1:	Basics of Matrices and linear algebra Solutions of Linear Equations: Direct Methods: Cramer"s Rule, Matrix Inversion Method, Gaussian Elimination Method, Gauss - Jordon Method, Matlab implementation
Unit II :	Iterative Method: Jacobi Method, Gauss - Seidal Method, Matlab implementation
Unit III:	Solutions of Non-Linear Equations: Root of a function, condition for root to lie between to end-points, Bisection Method, Secant Method, Newton-Raphson Method, Matlab implementation.
Unit IV:	Solution of Ordinary Differential Equations: 1st order differential equation,

	nth order differential equation, Solution of 1st order D.E: Taylor Series, Euler"s Method, Modified Euler"s Method, Runge – Kutta Methods
Unit V :	Matlab programming to solve differential equations Systems of O.D. Equations and Higher Order Diff. equations.
Text Book (s): Numerical Methods, R.V.Dukkipati., 2010, New Age International Publishers	
Reference Book (s): Introduction to numerical analysis Using MATLAB, Rizwan Butt, 2009, Jones and Bartlett Publisher.	
Mode of Evaluation: • Mid-Term Tests ……. ……..…….. (20 %) • Practical Work, Assignments, Quizzes, Homework……..…….. (40 %) • Final Exam. ……..……..…… (40 %)	

Course Title	**Principles of electric machines**	**Coordinator**			
Course Code	411-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	5
Prerequisites	313-EE-4	**Level/Year**		**10/4**	

Course Objective:

- At the end of this course, the student should be able to study DC machines, transformer and AC machines.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE.
- An ability to apply Knowledge of mathematics, science and engineering.
- Recognition of the need for and an ability to engage in lifelong learning

Course Contents:	
Unit 1:	Construction and Types of DC Machines: DC generator characteristics. Characteristics and starting of DC motors: Construction of single phase transformer and difference between ideal and practical transformers.
Unit II :	Three phase induction motors: construction, theory of operation, equivalent circuit. Exact and approximate equivalent circuits. Transformer characteristics. Transformer parameters determination,
Unit III:	Characteristics of 3-phase induction motor, starting and speed control of 3-phase induction motors
Unit IV:	3-ph Synchronous Machines: Construction and EMF
Unit V :	Phasor diagram. Loading conditions, voltage regulation.

Text Book (s):

- "Electric Machines", Drives and Power Systems", Theodore Wildi, Prentice Hall, 1996

Mode of Evaluation:

- Mid-Term Tests ……. ……..…..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..……..…… (40 %)

Course Title	**Automatic Control**	**Coordinator**			
Course Code	412-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	221-EE-4, 319MATH-	**Level/Year**		**10/4**	

Course Objective:

- This course introduces the design of feedback control systems as applied to a variety of air and spacecraft systems.
- Topics include the properties and advantages of feedback systems, time-domain and frequency-domain performance measures, stability and degree of stability, the Root locus method, Nyquist criterion, frequency-domain design, and state space methods

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To understand knowledge of societal, health, safety, legal management, sustainability and cultural issues and the consequent responsibility reverent to Electrical Engineering
- An ability to design and conduct experiments, analyze and interpret data
- The ability to function on multidisciplinary teams

Course Contents:	
Unit 1:	Introduction and System Modeling
Unit II :	Block Diagram reduction technique
Unit III:	Performance of Feedback Control SysteM
Unit IV:	Control of feedback control system
Unit V :	Frequency response

Text Book (s):

- „"KATSUHIKO OGATA, Modern Control Engineering, Fourth Edition"" 2003

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	Communication Systems	Coordinator			
Course Code	413-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	322-EE-4, 329-MATH-3	Level/Year		11/4	

Course Objective:

- Understand the analysis of communication systems.
- Analysis of types of modulation systems types of receivers, transmitters andmultiplexing methods.
- Understand The digital representation of analog signals, and have introduction to information theory and Coding.
- Apply the communication systems on Lab

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE
- An ability to design a system, component or process to meet desired needs within realistic constraints.
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Review of spectrum for periodic and aperiodic signals – continuous and line spectra
Unit II :	Linear modulation: Need for modulation, Expression for AM wave, power and BW, expression for DSB-SC/SSB, power and BW, comparison
Unit III:	Modulation and Demodulation of AM – Rectifier detector, envelope detector, Product Modulation and demodulation of DSB-SC, SSB – Frequency discrimination method, Hilbert transform, Phase discrimination method
Unit IV:	Angle Modulation: FM expression, Bessel function analysis, power and BW considerations, Carsons rule for BW approximation, PM expression, relationship between FM and PM, Armstrong method of FM generation, PLL and FM demodulation using PLL
Unit V :	Introduction to Information theory – Entropy, Source coding: Huffman code, Shannon Fano code.

Text Book (s):

- Grey Miller" Communication Electronics" McGraw Hill, 1999

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	**Computer Organisation-1**	**Coordinator**			
Course Code	414-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	312-EE-4, 329-MATH-3	**Level/Year**		**11/4**	

Course Objective:

- Name and recognize computer‟s transfers and microoperations
- Explaining and analyzing computer organization and architecture
- Ability to illustrate and demonstrate different parts of basic computer organization

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- The broad education necessary to understand the impact of nengineering solutions in a global, economic, environmental and societal context.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Introduction to Computer System & fundamentals Register Transfer Language, Register Transfer
Unit II :	Bus & Memory Transfer Arithmetic, Logic, & Shift Micro-Operation ALS Unit
Unit III:	Computer Register, Instruction Code, Computer Instructions
Unit IV:	Timing & Control, Instruction Cycle Complete Computer Description
Unit V :	Performance Measures Introduction to programming the Basic Computer

Text Book (s):

- Morris Mano, “Computer System Architecture”, Latest edition

Reference Book (s):

- Mark Balch, “A Comprehensive Guide to Digital Electronics & Computer System Architecture”, Latest Edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	High Voltage Engineering	Coordinator			
Course Code	421-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	221-EE-4	Level/Year		12/4	

Course Objective:

- This course focuses on the high voltage engineering in the electrical power systems, the high voltage benefits, types, generation methods, and laboratories.
- Breakdown theories are illustrated.
- The high voltage cables construction and types are included.
- Electrical circuit 1 and Measurements are prerequisites of this course

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.

To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE

Course Contents:	
Unit 1:	Introduction to power system architecture Advantages and disadvantages of HV
Unit II :	Types of regulators in the HV testing circuits Generation of HV – AC at Power frequency by transformer or by resonance transformer
Unit III:	Generation of HV – DC voltage (1) Generation of Impulse HV Generalized HV testing circuit Generation of HV – AC with High frequency
Unit IV:	HV Measurement methods Breakdown theories for Gases
Unit V :	Breakdown theories for liquids and solids UGC

Text Book (s):

- "High Voltage Engineering.", second edition, by M S Naidu & V Kamaraju, McGraw Hill - 2004

Mode of Evaluation:

- Mid-Term Tests ……. …….……..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)

Course Title	Electronics Circuits-2	Coordinator			
Course Code	422-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	323-EE-4	Level/Year		8/4	

Course Objective:

- To impart knowledge in students about operational amplifiers (Op-Amps), various electronic circuits using Op-Amps, Filters, Oscillators, Timer ICs and their applications in modern electronic systems

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE.
- An ability to apply Knowledge of mathematics, science and engineering.
- Recognition of the need for and an ability to engage in lifelong learning

Course Contents:	
Unit 1:	Op-amp basics and properties, inverting and non-inverting modes of operation with negative feedback. Effects of negative feedback on op-amp. Properties of Op-Amp: input and output impedances, frequency response.
Unit II :	Op-amp circuits: Comparators, Schmitt trigger, Summing and averaging amplifier, Integrator, Differentiator. OTA properties and application as amplitude modulator. Filters: LPF, HPF, BPF. Butterworth response filter design
Unit III:	Oscillators: feedback and relaxation oscillators, Wein
Unit IV:	IC 555 Timer, Astable and monostable multivibrator
Unit V :	Voltage regulation: Line and load regulation, Series regulators.

Text Book (s):

- Electronic Devices , 9th Edition, Thomas Floyed, Pearson Education, Limited, 2013

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	**Computer Organisation-2**	**Coordinator**			
Course Code	424-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	414-EE-4	**Level/Year**		**12/4**	

Course Objective:

- Name and recognize computer‟s transfers and micro-operations
- Explaining and analyzing computer organization and architecture
- Ability to illustrate and demonstrate different parts of basic computer organization

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To understand knowledge of societal, health, safety, legal management, sustainability and cultural issues and the consequent responsibility reverent to Electrical Engineering
- An ability to design and conduct experiments, analyze and interpret data
- The ability to function on multidisciplinary teams

Course Contents:	
Unit 1:	CPU Major Component General Register Organization, Stack Organization Instruction Format Addressing Mode
Unit II :	Data Transfer & Manipulation Program Control Reduced Instruction Set Computers
Unit III:	Parallel processing, RISC Pipeline, Vector Processing
Unit IV:	Memory Hierarchy, Memory types
Unit V :	Memory management hardware

Text Book (s):

- Morris Mano, “Computer System Architecture”, Latest edition

Reference Book (s):

- Mark Balch, “A Comprehensive Guide to Digital Electronics & Computer System Architecture”, Latest Edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…..…… (40 %)

Course Title	Electric Power Systems	Coordinator			
Course Code	425-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	313-EE-4	Level/Year		12/4	

Course Objective:

- The main purpose of this course is to teach the students the design and analysis of electric circuits.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE
- An ability to design a system, component or process to meet desired needs within realistic constraints.
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	The Power System: An overview, Transmission Line Parameters
Unit II :	Line Model and Performance,Power/
Unit III:	Load Flow Analysis Per-Unit System
Unit IV:	Balanced Faults,
Unit V :	Mechanical Design of Overhead Lines

Text Book (s):

- Power System Analysis", HadiSadaat, McGraw Hill.

Reference Book (s):

- Power System Analysis", J. Grainger and D.Stevenson, McGraw Hill.

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Integrated Circuits	Coordinator			
Course Code	512-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	422-EE-4	Level/Year		13/5	

Course Objective:

- To inculcate in students the understanding of and experience in the design of VLSI circuits, especially CMOS technology

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- The broad education necessary to understand the impact of nengineering solutions in a global, economic, environmental and societal context.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Introduction to VLSI Systems: Historical Perspective, Introduction to IC Technology, Types of Integrated Circuits,
Unit II :	VLSI Design Methodology, VLSI Design Flow, VLSI Design Styles. MOS Transistor: MOS Capacitor, MOS Transistor, Threshold Voltage, Current Equations, I-V Characteristics, Scaling, Small Geometry Effects, MOSFET Capacitances.
Unit III:	VLSI Process Technology: Photolithography, Oxidation, Plasma Enhanced Chemical Vapour Deposition, Diffusion, Ion Implantation, Etching, Metallization, Packaging. Design Rules & Layout: Stick Diagrams.
Unit IV:	CMOS Logic Design: Design of CMOS Inverter, NAND and NOR gates, CMOS Transmission Gate, Types of CMOS logic circuits, Compound Gates.
Unit V :	Memories & Programmable Logic Devices: CMOS Memories – SRAM and DRAM cells, Types of Programmable Logic Devices, Field Programmable Gate Arrays.

Text Book (s):

- CMOS VLSI Design: A circuits and systems perspective. By Neil H. E. Weste

Mode of Evaluation:

- Mid-Term Tests ……. …….……..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. …….…….…… (40 %)

Course Title	Microprocessor Based System	Coordinator			
Course Code	513-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	414-EE-4	Level/Year		13/5	

Course Objective:

- The main purpose of this course is to teach the students the fundamental theory of microprocessors and their applications

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.

To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE

Course Contents:	
Unit 1:	Introduction to microprocessors and microcontroller systems, Microprocessor model, Techniques used in microprocessor, Microprocessor programming techniques,
Unit II :	Looping , Counting, Indexing, Flowchart,
Unit III:	Timing delay using counters, Stacks and subroutines
Unit IV:	I/O memory interface with microprocessor Input output system, I/O data transfer techniques DMA transfer I/O interfacing techniques with microprocessor
Unit V :	Microcontrollers Microcontrollers and microprocessors Microcontrollers in control systems

Text Book (s):

- "Microprocessor and microcontroller System", A.P Godse and Mrs. D. A. Godse , Technical Publications

Mode of Evaluation:

- Mid-Term Tests ……. …….……..….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Power Electronics	Coordinator			
Course Code	514-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	221-EE-4, 223-EE-4	Level/Year		14/5	

Course Objective:

- At the end of this course, the student should be able to study Power electronic elements and application.
- Analyze the equivalent circuit of power electronics , application of different converter types of electrical machines Calculate the operating condition of the machines to have desired condition Analyze the troubleshooting table of machines
- Define basic concepts and basic circuit of power electronics.

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE.
- An ability to apply Knowledge of mathematics, science and engineering.
- Recognition of the need for and an ability to engage in lifelong learning

Course Contents:	
Unit 1:	Power Semiconductor diodes Diode circuits and uncontrolled rectifier circuits.
Unit II :	Thyristors , firing techniques and protection methods.
Unit III:	Rectifier circuits applications, Controlled rectifier circuit.
Unit IV:	AC voltage controllers DC choppers
Unit V :	Single and three phase Inverters Power electronic application on power system.

Text Book (s):

- "Power Electronics, Circuits, Devices and Applications", Muhammad H. Rashid, Second edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Operating Systems	Coordinator			
Course Code	521-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	424-EE-4	Level/Year		14/5	

Course Objective:

- Identify the operating systems, processes and systems manage files and folders
- Understanding the interrupt programs and contexts drivers, clock drivers, input and output programs.
- Identify the Unix operating system Windows operating system, file management system on the network.
- Acquire the skills to run operations in parallel

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To understand knowledge of societal, health, safety, legal management, sustainability and cultural issues and the consequent responsibility reverent to Electrical Engineering
- An ability to design and conduct experiments, analyze and interpret data
- The ability to function on multidisciplinary teams

Course Contents:	
Unit 1:	Operating system functions, Structure architecture and operations
Unit II :	process management memory management distributed systems Special purpose systems.
Unit III:	user operating system interface
Unit IV:	Process concept
Unit V :	Unix operating system Windows operating system file management system on the network.

Text Book (s):

- Abraham Silberschatz, Peter Galvin and Greg Gagne "Operating System Concepts",

Reference Book (s):

- Stallings William, "Operating Systems: Internals and Design Principles", Prentice-Hall, most recent edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	**Electric Power System Analysis**	**Coordinator**			
Course Code	522-EE-4	**Credit Hrs.**	**4**	**Contact Hrs.**	**5**
Prerequisites	425-EE-4	**Level/Year**		**14/5**	

Course Objective:

- To understand and analyze the main theories for steady state stability, and the transient stability of the power system. Knowing the modeling and analysis of power system operation and control.
- This course describes the various methods of reactive power compensation in the power system

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE
- An ability to design a system, component or process to meet desired needs within realistic constraints.
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	The transient stability of power system (analysis and applications). Swing equation Equal area criterion
Unit II :	The steady state stability of power system (analysis and applications).
Unit III:	Speed governors (analysis and operation). Outlining Methods of reactive power control
Unit IV:	Defining Sharing load between units. Describing the errors elimination in frequency and tie line power.
Unit V :	Recognizing Automatic generation control. AVR ALFC Describing Voltage stability and excitation systems

Text Book (s):

- Hadi Saadat, Power system Analysis, McGraw hill. 1999. Latest edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…… (40 %)

Course Title	Advanced Communication Systems	Coordinator			
Course Code	523-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	413-EE-4	Level/Year		15/5	

Course Objective:

- Define and describe established rules in digital communications
- Recognize the purpose and importance of techniques used in digital communications
- Calculate parameters such as bandwidth, error rate
- Analyse system conditions by interpreting the specified data
- Design a system/process to satisfy stated conditions and explain engineering trade-offs

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- The broad education necessary to understand the impact of nengineering solutions in a global, economic, environmental and societal context.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility

Course Contents:	
Unit 1:	Introduction to Digital Communication, two-sided spectrum Sampling theory, Quantization, PCM, DPCM, DM and comparison, Binary and M-ary signaling
Unit II :	Signal detection in the presence of AWGN: ML Detection, Matched Filtering, Probability of Error for binary and M-ary signaling, Trade-off between error probability and data rate.
Unit III:	Introduction to error detection/correction: Channel capacity – Shannon Hartley law, Parity codes, Hamming code encoding and syndrome decoding.
Unit IV:	Random Processes, Stationary and Ergodic Processes, Auto-correlation and cross-correlation, power spectral density, white Gaussian noise.
Unit V :	Digital Modulation techniques: ASK, QAM, PSK,

	• QPSK, • FSK

Text Book (s):

- Digital Communications: Fundamentals and Applications, Bernard Sklar, 2001, Prentice Hall.

Reference Book (s):

- Modern Digital and Analog Communications Systems, 4th edition (2009, with Zhi Ding), Oxfor University Press

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..……..…… (40 %)

Course Title	Software Engineering	Coordinator			
Course Code	524-EE-4	Credit Hrs.	4	Contact Hrs.	5
Prerequisites	414-EE-4	Level/Year		15/5	

Course Objective:

- Understanding the basics of the system architecture based on computer operations and programming
- Recognition system models with a focus on models commonly used.
- Identify the Unix operating system Windows operating system, file management system on the network

Teaching Method:

- Lectures, Training exercises (Tutorial + Labs, Assignments, Reports)

Expected Learning Outcome:

- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Knowledge of contemporary Issues.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- To define knowledge of mathematics, science and engineering fundamentals relevant to engineering, together with in depth knowledge of EE

Course Contents:	
Unit 1:	Professional software development Software process models & The rational unified process Functional and non-functional requirements
Unit II :	The software requirements document Interaction models, Structural models & Behavioral models
Unit III:	Model-driven engineering Object-oriented design using the UML
Unit IV:	Open source development Test-driven development & User testing
Unit V :	Program evolution dynamics Legacy system management Dependability properties

Text Book (s):

- Ian Sommerville "Software Engineering" 9/E, ISBN 10: 0137035152. Ahern, D. M., Clouse, A. and Turner, R.(2001). CMMI Distilled. Reading, Mass.: Addison-Wesley.

Reference Book (s):

- Leach, R., "Introduction to Software Engineering", CRC Press, most recent edition

Mode of Evaluation:

- Mid-Term Tests ……. ……..…….….. (20 %)
- Practical Work, Assignments, Quizzes, Homework……..…….. (40 %)
- Final Exam. ……..…….…… (40 %)