Course Syllabi

ELECTRICAL ENGINEERING (BIOMEDICAL) PROGRAM

Faculty of Engineering
King Abdulaziz University
Jeddah, Kingdom of Saudi Arabia

July 1st, 2014

Part I: The BME Program Courses

EE 201: Structured Computer Programming

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Structured Computer Programming	EE 201	201 هـ ك	1	3	-	2
Pre-requisites:	MATH 110, CPIT 100					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 202, EE 332			
Catalogue Description:						
Introduction to computers. Simple algorithms and flowcharts. Solving engineering and mathematical problems using a mathematically-oriented programming language. Programming concepts: I/O, assignment, conditional loops, functions and subroutines. Programming selected numerical and non-numerical problems of mathematical and engineering nature.						

Textbooks:

1. W.J. Palm III, Introduction to MATLAB 7 for Engineers, McGraw-Hill International Edition, 2005.

Supplemental Materials:

1. Course slides (published at the course website: http://ece.goto-school.com/)

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Describe the engineering problems and need for computer solutions.
2. Describe the structured programming and choosing MATLAB as a mathematically-oriented programming language.
3. Express basic operations, how to use menus, Help System, and different tools in MATLAB.
4. Compute simple mathematical expressions, and manage variables in Interactive mode of operation.
5. Create, address, edit arrays, and perform array and matrix operations including addition, subtraction, multiplication, division, and exponentiation.
6. Apply the most common mathematical functions stored in MATLAB to create and use user defined functions including storing them in a function file and plotting those using graphing functions: XY plots - subplots.
7. Describe the fundamentals of programming design and development, using Algorithms, and program documentations like Flowcharts and pseudo-code.
8. Design programs that perform decision-making procedures using Relational and Logical operators, and conditional IF statements and SWITCH structure.
9. Design programs that repeat calculation a specified number of times, and/or until some condition is satisfied using MATLAB loop structures.
10. Debug programs and use simulations in engineering applications.

Topics to be Covered:	***Duration in Weeks:***
1. Engineering Problems and the Need for Computer Solutions	0.5
2. Basics of MATLAB: Menus – Toolbars – Computing with MATLAB – Script Files and the Editor/Debugger – MATLAB help System.	0.5
3. Arrays, Matrices and Matrix Operations.	2.5
4. User-Defined Functions.	1
5. Basics of Programming: Algorithms - Pseudo Code - Flow Charts – Programming Structures.	1.5
6. Program Design and Development.	1
7. Relational Operations and Logical Variables.	0.5
8. Logical Operators and Functions.	0.5
9. Conditional Statements: if – else – elseif – switch	2
10. Loops: for – while – break – continue.	2
11. Debugging MATLAB Programs.	1
12. Working with Data Files, and Graphing Functions: XY Plots – Sub-Plots	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Wassim Zouch

Last updated: September 2013

EE 202: Object-Oriented Computer Programming

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Object-Oriented Computer Programming	EE 202	202 هـ ك	2	3	-	3
Pre-requisites:	EE 201					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 305, EE 364, EE 366			
Catalogue Description:						
Object-oriented programming: classes, objects and methods. Object-oriented design. Simple data structures. Best programming practices (structured coding, documentation, testing and debugging).						

Textbooks:

1. H. Deitel and P. Deitel , Java: how to program, 8th ed. Prentice-Hall, 2009.

Supplemental Materials:

1. C. Thomas Wu, An introduction to object-oriented programming with JAVA, 5th ed., McGraw-Hill, 2009.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Apply available classes to write simple application programs
2. Identify the difference between objects and classes
3. Create simple classes based on predefined requirements
4. Apply loops and conditional statements to write simple programs or methods
5. Write class and object methods
6. Identify the main use of arrays and write methods that deal with array data
7. Apply tracing concept to given application program that deal with so many classes
8. Write mathematical expressions and I/O statements
9. Write statements to handle exceptional errors
10. Apply the Java SDK and the Eclipse IDE to develop applications
11. Understand engineering ethics

Topics to be Covered:	***Duration in Weeks:***
1. The basic idea of Classes and Objects, Messages and Methods, Data Values, Inheritance, Software Engineering Life Cycle, Java Program Components.	2
2. Numerical Data: Variables, Arithmetic Expressions, Constants, I/O.	2
3. Self defined Classes: Constructors, Class/Object Methods, Data Members, Class/Object Constants, Methods/Constructors Overloading, Parameters Passing, Organizing Classes into Packages, Javadocs Comments.	3
4. Flow Control: If Statement, Nested If Statement, Boolean Expressions, Switch Statement, For/do/While Loops.	2
5. Arrays: Defining an Array, Arrays of Objects, Two-Dimensional Arrays, Lists and Maps.	2
6. Classes: overloading constructor, this, Composition, static members, Final instance variables, Data abstraction. Error handling	3

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	x
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course: (f)
Instructor or course coordinator: Dr. Rami A. Al-Hmouz
Last updated: September 2013

EE 250: Basic Electrical Circuits

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Basic Electrical Circuits	EE 250	250 هـ ك	3	2	-	4
Pre-requisites:	PHYS 202					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 301, EE 302, EE 306, EE 311, EE 341, EE 351, EE 360			
Catalogue Description:						
Electric quantities and circuit elements. Kirchhoff's laws. Mesh and node analyses. Sinusoidal steady-state analysis using phasors. Network theorem and transformations. Ideal transformers. Three-phase circuits.						

Textbooks:

1. C.K. Alexander and M.N.O. Sadiku, Fundamentals of electric circuits, 4th ed, McGraw-Hill,

Supplemental Materials:

1. W. H. Hayt, Engineering Circuit Design, 8th. Ed. McGraw-Hill 2008.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Understand fundamental electric quantities: voltage, current, electric power and energy, dependant and independent voltage and current sources.
2. Calculate the currents and voltages in resistive circuits using Ohm's law, KCL, KVL, reduction of series and parallel resistances, voltage and current divisions, nodal and mesh analysis, and superposition.
3. Apply KVL, KCL, nodal and mesh analysis to circuits containing dependent sources.
4. Apply network theorems to simplify a resistive circuit by finding the Thevenin or Norton equivalent of a two-terminal network
5. Evaluate effective or rms values of AC voltages and currents, find the phasor voltage (current) for a given sinusoidal voltage (current), and find the sinusoidal voltage (current) for given phasor voltage (current) and frequency.
6. Convert an AC steady-state circuit to a phasor circuit and analyze a phasor circuit using Ohm's law, KCL, KVL, reduction of series and parallel impedances, and voltage and current divisions.
7. Calculate AC steady-state power dissipated by the circuit elements in a circuit and express the concepts of power factor, complex power, and conservation of power.
8. Solve single and three phase circuits for the real, reactive and complex power and explain the principle of power measurement and instrumentation
9. Derive the voltage and current relationship for an ideal transformer
10. Explain the operation and construction of DC machines, and derive the emf equation.
11. Explain the Concept of rotating magnetic field, principle of operation, and constructional features of three-phase induction and synchronous machines
12. Work with a small team to carry out experiments in electric circuits and prepare reports that present lab work.

Topics to be Covered:	***Duration in Weeks:***
1. Fundamental electric quantities: voltage, current, power and energy	1
2. Resistance, capacitance and inductance, Kirchhoff's laws (KVL & KCL), Source equivalence and series and parallel equivalent resistance	1
3. Mesh current (loop) and node voltage analysis	1.5
4. Circuit theorems	1
5. Sinusoidal excitation, average and effective values	0.5
6. Steady state A.C. circuit and impedance and phasor diagrams	2
7. AC power analysis Power triangle and power factor correction	1
8. Balanced three phase circuits and power measurement	1.5
9. Introduction to electromagnetism and Ideal transformer	1.5
10. Introduction to DC machines	1
11. Introduction to three phase induction motors	1
12. Introduction to synchronous machines	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	x
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (d)

Instructor or course coordinator: Dr. Mohammed N. Ajour

Last updated: September 2013

EE 300: Analytical Methods in Engineering

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Analytical Methods in Engineering	EE 300	300 هـ ك	3	1	-	3
Pre-requisites:	MATH 203					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 331			
Catalogue Description:						
Linear algebra: matrices and determinants, eigenvalues and eigenvectors. Complex analysis: complex arithmetic, complex algebra, differentiation and integration in the complex plane and residue analysis. Graphs, Fundamental loops and fundamental cutsets.						

Textbooks:

1. E. Kreyzig, Advanced Engineering Mathematics, 9th Ed, Wiley, 2006

Supplemental Materials:

1. P. O'Neil, Advanced Engineering Mathematics, ISE-Thomson, 2009
2. D. Zill and P. Shanahan, Complex Analysis, Jones and Bartlett, 2003.
3. F. Ayres, Matrices, McGraw-Hill, 1974.
4. W. Chen, Applied Graph Theory, North-Holland, 1976

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Manipulate complex numbers in different basic mathematical operations, compute function values of complex variables and differentiate and integrate complex variable functions.
2. Describe the geometry of analytic functions
3. Manipulate various types of series: power, Taylor and Laurent, apply Cauchy integration formula and residual theorem and use contour integration to evaluate real improper integrals.
4. Express the concept of scalars, vectors and matrices, and construct simple mathematical proofs that are of engineering utility.
5. Recognize and handle some important classes of matrices: symmetric, skew-symmetric, involutory, idempotent, nilpotent, orthogonal, and orthonormal
6. Recognize the linear dependency and independency of vectors
7. Examine the existence of a square matrix inverse and calculate the matrix inverse using Gauss-Elimination method, the Gauss-Jordan method and the Cofactor method
8. Solve linear equations using Gauss-Elimination method and Cramer's rule
9. Compute matrix eigenvalues and their associated eigenvectors and eigenspaces and apply the fundamental concepts of matrix eigenvalues in practical problems.
10. Explain the concept of graphs and directed graphs, and apply the graph theory to obtain and relate the reduced incidence matrix, the fundamental cutest matrix, and the fundamental loop matrix, based on a specific choice of datum (reference) node and spanning tree.
11. Write KCL and KVL for a given directed graph and express tree currents in terms of link currents and link voltages in terms of tree voltages.

Topics to be Covered:	***Duration in Weeks:***
1. Complex numbers and operations	1.5
2. Special complex functions	1.5
3. Complex derivatives	1.5
4. Various types of series: power, Taylor, and Laurent	1
5. Integration in the complex plane	1
6. Residue integration and its applications	1.5
7. Introduction to linear algebra and vector spaces	1.5
8. Basic concepts, properties, and algorithms of matrices, their inverses and determinants	1.5
9. Eigenvalues and eigenvectors and their applications	1.5
10. Introduction to graph theory	1.5

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Ali M.Rushdi

Last updated: January 2014

EE 301: Electrical Circuits and Systems

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electrical Circuits and Systems	EE 301	301 هـ ك	3	1	-	3
Pre-requisites:	MATH 204, EE 250					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 321, EE 331, EE 470			
Catalogue Description:						
Resonance circuits. Magnetically-coupled circuits. Op-amp circuits. Transient analysis via the conventional and Laplace methods. Fourier analysis with applications to circuits. Two-port networks.						

Textbooks:

1. C. K. Alexander, and M. N. Sadiqu, Fundamentals of Electric Circuits, 5th ed., McGraw-Hill, 2011.

Supplemental Materials:

1. J. W Nilsson, and S. Riedel, Electric Circuits, 9th ed., Addison Wesley, 2010.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Analyze ideal op-amp circuits to calculate the transfer function, differentiate whether or not a circuit has initial conditions, and find them if not given.
2. Analyze electric circuits with magnetically-coupled elements.
3. Identify the two types of resonance circuits and analyze them to get the resonant frequency, corner frequencies, power, bandwidth, and quality factor.
4. Transfer circuit elements into Laplace domain and solve circuits using Laplace transform method.
5. Calculate the Fourier Series coefficients of periodic signals and analyze electrical circuits of multiple periodic sources utilizing Fourier Series techniques.
6. Mathematically derive the Fourier Transform of non-periodic signals and analyze electrical circuits of non-periodic sources utilizing Fourier Transform techniques.
7. Derive the impulse response and the transfer function of linear systems using Fourier and Laplace Transforms.
8. Derive the convolution integral form of two signals, use the convolution integral to find the response of electrical circuits and the graphical method of the convolution integral to find the electrical circuit response.
9. Differentiate between one-port and two-port networks, calculate the different parameters of two-port networks and analyze the terminated and non-terminated two-port networks in different interconnections.

Topics to be Covered:	***Duration in Weeks:***
1. Operational Amplifiers (Chapter 5)	2
2. Magnetically Coupled Circuits (Chapter 13)	2
3. Frequency Response (Chapter 14)	2
4. The Laplace Transform (Chapter 15)	2
5. Applications of Laplace Transforms (Chapter 16)	1

6. Fourier Series (Chapter 17) 2
7. Fourier Transform (Chapter 18) 1.5
8. Two-Port Networks (Chapter 19) 1.5

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	x
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (a)
Instructor or course coordinator: Mohamed Alshenqeeti
Last updated: September 2013

EE 302: Electromagnetic Fields

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electromagnetic Fields	EE 302	302 هـ ك	3	1*	-	3
Pre-requisites:	EE 250, MATH 205					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 423, EE 472			
Catalogue Description:						
Electrostatic fields. Poisson and Laplace equations. Steady Electric Current. Steady Magnetic Field. Time-varying electric and magnetic fields. Maxwell equations.						

*Includes a one-hour tutorial session

Textbooks:

1. Ulaby, F., Fundamentals of Applied Electromagnetics, Prentice-Hall, Sixth Edition, 2010 Media Edition

Supplemental Materials:

1. Nasar, S., 2000 Solved problems in Electromagnetics (Schaum's Solved Problems Series), McGraw-Hill, 1992
2. Edminister, J., Schaum's Outline of Electromagnetics, McGraw-Hill, 2nd Edition, 1994

Course Learning Outcomes:

By the completion of the course the student should be able to:

Topics to be Covered:	***Duration in Weeks:***
1. Review of Maxwell's Equations and Their History	1
2. Review of Linear Systems In Time and Frequency Domains	1
3. Plane Waves In Multi Regions (Normal Incidence)	1
4. Electric Field Polarization and Poynting Theorem and Power flow	1
5. Plane Waves In Multi Regions (Oblique Incidence)	1
6. Parallel Plate Waveguide (TE&TM modes)	1
7. Rectangular Waveguide (TE&TM modes)	1
8. Circular Cylindrical Waveguide (TE&TM modes) : Bessel Functions	1
9. Rectangular and Circular Cylindrical Cavity Resonators (TE&TM modes)	1
10. Transmission Line Theory: Voltage and current equations	1
11. Lossy and Lossless Lines, Attenuation and Propagation	1
12. Input and Characteristic Impedances of the Line	1
13. Smith Chart and Matching Techniques	1
14. Measurements Techniques	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical,	

health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	x
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	x
(j) a knowledge of contemporary issues	x
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:
Instructor or course coordinator: Dr. Hatem M. Rmili
Last updated: December 2013

EE 306: Electrical Engineering Technologies

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electrical Engineering Technologies	EE 306	306 هـ ك	2	3	-	3
Pre-requisites:	EE 250, STAT 110					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 370			
Catalogue Description:						
Electrical engineering fields of activities. Sources of electrical energy: power supplies, batteries, generators and alternative power sources. Distribution and utilization of electrical energy, commutators and protection devices. Conversion of electrical energy; sensors and actuators. Electrical safety. Principles of electrical and electronic measurements and instrumentation, standards and calibration. Sources of measurement errors, and analysis of measured data.						

Textbooks:

1. No definite textbook will be followed. Lecture and lab notes, and copies of slides will be published on this site

Supplemental Materials:

1. R.B. Northrop, Introduction to Instrumentation and Measurements, 2nd ed., CRC Press, 2005.
2. D. Stanley, J.R. Hackworth and R.L. Jones, Fundamentals of Electrical Engineering and Technology, Delmar Cengage Learning, 2006.
3. John G. Webster (editor), Electrical Measurement, Signal Processing and Displays, CRC Press, 2004.
4. hultz, Grob's Introduction to Electronics, McGraw-Hill, 2007

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Choose proper Electrical Engineering components for specific applications
2. Explain the sources of measurement errors, characteristics of measuring instruments that yields the error and need for calibration.
3. Apply statistical analysis tools (mean, median, histogram, variance ..etc) to describe collected data.
4. Apply error propagation in calculations that use data with uncertainties.
5. Choose the characteristics of a realistic energy source for specific applications.
6. Discover the proper specifications for the measuring device based on the properties of the quantity to be measured.
7. Explain how small circuit components collectively combine to perform larger tasks.
8. Express the principle of operation of some electrical measuring instruments.
9. Express the principle of operation of CRT.
10. Select protection schemes and devices for safe operations of electrically operated devices.
11. Identify the critical issues for sensor choice, placement, and circuit implementation
12. Analyze temperature measuring circuits and systems.
13. Analyze circuits and systems used in measuring mechanical strain and stress.

Topics to be Covered:	***Duration in Weeks:***
1. Introduction, Energy Sources, Conductors and Insulators,	0.5
2. Resistors, Capacitors, Inductors, Transformers	1.5
3. Measurement and Error Design of experiments and data analysis	1
4. Uncertainty analysis	1
5. Measurements of Voltage, Current and Resistance	1
6. Measurement of AC current and Voltage	1
7. Oscilloscope,	1
8. Digital Measurement instruments	1
9. Measurement of Electrical Energy	1
10. Batteries, Fuses and Breakers, Electrical Safety	2
11. Temperature measurement,	1.5
12. Measurement of displacement and mechanical strain	1.5

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (b)
Instructor or course coordinator: Dr. Abdulhameed F. Alkhateeb
Last updated: June 2014

EE 311: Electronics I

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electronics I	EE 311	311 هـ ك	3	3	-	4
Pre-requisites:	EE 250					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 303, EE 312, EE 411, EE 442			
Catalogue Description:						
Conduction in metals and semiconductors, P-N junctions, diode circuits. Field-effect and junction transistors. Low frequency equivalent circuits. Basic amplifiers.						

Textbooks:

1. Microelectronic Circuits, by Adel S. Sedra, and Kenneth C. Smith, Oxford University Press, USA, 6th Edition (December 15, 2009)

Supplemental Materials:

1. Course notes, Course project, Homework problems

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Analyze diode circuits using ideal and linear methods
2. Design application circuits utilizing diodes
3. Design BJT amplifiers with given gain, input and output resistance
4. Design FET amplifiers with given gain and interface
5. Use OrCAD Spice simulator for analysis and design
6. Setup experiments to measure and verify semiconductor circuits
7. Work effectively in a team

Topics to be Covered:	***Duration in Weeks:***
1. Diode Circuit Analysis	2
2. Applications of Diodes	2.5
3. Bipolar Junction Transistor (BJT)	7
4. Metal Oxide Semiconductor (MOSFET)	2.5

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	x
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	x
(h) the broad education necessary to understand the impact of engineering solutions	

in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (c),(d),(g)
Instructor or course coordinator: Dr. Md Shofiqul Islam
Last updated: May 2014

EE 312: Electronics II

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electronics II	EE 312	312 هـ ك	3	3	-	4
Pre-requisites:	EE 311					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 413, EE 416, EE 418, EE 420, EE 471, EE 493			
Catalogue Description:						
Feedback in amplifiers. Frequency response of amplifiers. Operational amplifiers: design and applications as linear and non-linear analog building blocks, adders, subtractors, differentiators, integrators, analog simulation, and active filters. Logarithmic and exponential amplifiers, precision converters, analog multipliers, wave-shapers, sinusoidal and square wave oscillators.						

Textbooks:

1. A.S. Sedra, and K.C. Smith, Microelectronic Circuits, 6th Ed., Oxford University Press, 2009
2. M.H. Rashid, Microelectronic Circuits: Analysis and Design, 2nd Ed., 2011

Supplemental Materials:

1. George Clayton, Steven Winder, Operational Amplifiers, 5th Ed., Newnes, 2003
2. David Terrell, Op Amps Design Application and Troubleshooting, 2nd Ed., Butterworth-Heinemann, 1996

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Describe the external characteristics of op-amps and analyze the operation of linear analog circuits using ideal op-amps
2. Design linear analog building blocks using op-amps
3. Design analog active filters given type and customer specifications
4. Calculate non-ideal characteristics of op amp circuits and design for maximum allowed upper bounds
5. Estimate the implementation cost of op-amp application
6. Design and implement given arbitrary analog transfer functions of rational polynomials
7. Simulate and verify amplifiers and filters using CAD tools
8. Work in a team effectively

Topics to be Covered:	***Duration in Weeks:***
1. Ideal Op Amp Analysis	2
2. Non-Ideal Op Amp Characteristics	4
3. Active Filters Design	4
4. Transfer Function Design	4

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	

(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (c)
Instructor or course coordinator: Dr. Amjad Hajjar
Last updated: February 2014

EE 321: Introduction to Communications

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Introduction to Communications	EE 321	321 هـ ك	3	3	-	4
Pre-requisites:	EE 301					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 413, EE 421, EE 429, EE 494			
Catalogue Description:						
Fourier Signal Analysis. Linear Modulation: AM, DSBSC, SSB, Frequency Conversion, generation and detection. FDM, Exponential Modulation: FM, PM, NBFM, WBFM. Pulse Modulation, Sampling Theorem, PAM, PDM, PPM, PCM, TDM, Digital Modulation ASK, PSK and FSK.						

Textbooks:

1. B. P. Lathi and Z. Ding, Modern Digital and Analog Communication Systems. Int. 4th Ed., Oxford Univ. Press, 2010.

Supplemental Materials:

1. Course Notes: First day materials, Course project, Guide to assignments.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Analyze signals in time and frequency domains.
2. Analyze linear, time-invariant systems in time and frequency domains.
3. Analyze and design an amplitude modulation system in time and frequency domain.
4. Analyze and design an angle modulation system in time system and frequency domain.
5. Apply the sampling theorem and describe and perform simple analysis of pulse modulation systems.

Topics to be Covered:	***Duration in Weeks:***
1. Classifications of signals and systems. Energy and power signals, Linear time invariant systems (LTI), Fourier series representation, Fourier transform, Spectral properties and bandwidth, unit step and unit impulse functions, Impulse response and transfer function of linear systems, Filters (LPF, HPF, and BPF)	5
2. Amplitude modulation (Double side-band - Large carrier (DSB-LC)), Double side-band-Suppressed Carrier (DSB-SC), Single side-band (SSB); Hilbert Transform , Vestigial side-band (VSB); Spectral analysis, modulators, demodulators, Super heterodyne receiver.	4
3. Frequency modulation, Phase modulation; spectral analysis, bandwidth, generation, detection, discriminators, phase-locked-loop (PLL), Frequency division multiplexing (FDM)	4
4. Sampling theorem, Pulse amplitude modulation (PAM), Time-division multiplexing (TDM), Pulse width modulation (PWM), Pulse position modulation (PPM),Pulse code modulation (PCM)	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	x
(i) a recognition of the need for, and an ability to engage in life-long learning	x
(j) a knowledge of contemporary issues	x
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (f),(h),(i),(j)
Instructor or course coordinator: Dr. Fuad E. Alsaadi
Last updated: April 2014

EE 341: Electromechanical Energy Conversion I (Elective)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Electromechanical Energy Conversion I	EE 341	341 هـ ك	3	1*	-	3
Pre-requisites:	EE 250					
Course Role in Curriculum	*Required or Elective:*		Elective			
	A pre-requisite for:		EE 441, EE 445, EE 454			
Catalogue Description:						
Theory and modeling of electromechanical devices. Magnetic circuit. Power transformers. Physical construction and applications of D. C. machines. Qualitative introduction to A.C. Machines.						

*Includes a one-hour tutorial session

Textbooks:

1. A. E. Fitzgerlad, Charles Kingsley, Jr., and Stephen D. Umans, Electric Machinery", Sixth Edition, McGraw-Hill, NY, USA, 2006.

Supplemental Materials:

1. Lecture notes

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. By the completion of the course the students should be able to:
2. Identify the magnetic circuit parameters and analyze magnetic circuits.
3. Identify the transformer equivalent circuits.
4. Understand the open-circuit and short-circuit tests of transformer and calculate the voltage regulation and efficiency of transformer.
5. Understand the electromechanical energy conversion principles.
6. Identify the rotating machine concepts.
7. Classify the different types of the direct current (DC) machines.
8. Analyze steady state performance of different type of DC machines.
9. Recognize control methods of DC motors.

Topics to be Covered:	***Duration in Weeks:***
1. Magnetic circuits	2
2. Transformers	4
3. Principles of electromechanical energy conversion	1
4. Introduction to rotating machines	1
5. DC machines	5
6. Control of DC motors	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	x
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Makbul A. M. Ramli

Last updated: January 2014

EE 360: Digital Design I

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Digital Design I	EE 360	360 هـ ك	3	2	-	4
Pre-requisites:	EE 250					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 361, EE 366, EE 411, EE 460			
Catalogue Description:						
Representation and manipulation of digital information Basic Boolean logic. Elements of digital building blocks. Computer arithmetic unit. Memory unit. Input-Output unit. Basic operation of the computer control unit.						

Textbooks:

1. M. Moris Mano and Maichael D. Ciletti, Digital Design, 4th edition, Prentice Hall, 2007.

Supplemental Materials:

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Describe and convert between different number systems and codes
2. Apply different binary representations for signed numbers and their addition operation
3. Apply various techniques to simplify Boolean functions
4. Describe Boolean functions using different two level representations
5. Design and Analyze combinational circuits
6. Design and Analyze sequential networks such as counters, shift registers and similar circuits
7. Apply software tools to design, simulate, and test digital systems
8. Apply the Verilog HDL to design and simulate digital systems

Topics to be Covered:	***Duration in Weeks:***
1. Binary number systems, number representations, and codes	1
2. Boolean algebra and Boolean functions	1.5
3. Logic gates and circuits	1.5
4. Logic simplification using Boolean algebra and Karnaugh maps	2
5. Combinational logic design and building blocks	2
6. Synchronous sequential logic design and state machines	2
7. Latches, Flip-flops, registers and counters	2
8. Verilog programming and simulation	2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical,	x

health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	x
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course: (c),(g),(k)
Instructor or course coordinator: Dr. Abdullah Balamash
Last updated: February 2014

EE 366: Microprocessor and Microcontrollers

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Microprocessor and Microcontrollers	EE 366	366 هـ ك	2	3	-	3
Pre-requisites:	EE 202, EE 360					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 466, EE 480			
Catalogue Description:						
Design of microcontroller-based embedded systems. Overview of a single-chip microcontroller, hardware and software concepts in microcontrollers. System architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH). Input/ Output ports, serial communication, programmable interrupts. ADC, DAC, interfacing and timers. Microcontroller programming model and instruction set, assembly and C language programming.						

Textbooks:

1. Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, PIC Microcontroller and Embedded systems – Using Assembly and C for PIC18, Prentice Hall, 2008.

Supplemental Materials:

1. Barry B. Brey, Applying PIC18 Microcontrollers Architecture, Programming and interfacing Using C and Assembly, Prentice Hall, 2008.
2. Dogan Ibrahim, Advanced PIC Microcontroller Projects in C: from USB to RTOS with the PIC18F Series, Elsevier, 2008.
3. Milan Verle, "PIC Microcontrollers Programming in C," MikroElektronika.
4. Microchip web site (www.microchip.com).
5. MikroElektronika web site (www.mikroe.com).

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Identify the Hardware Architecture, Memory, Register Structure of a PIC Microcontroller and the differences and similarities between a Microprocessor and Microcontroller.
2. Explain and Apply PIC I/O Port Programming
3. Develop an ability to interface a microcontroller to various devices.
4. Develop an ability to effectively utilize the wide variety of peripherals integrated into a microcontroller.
5. Illustrate an ability to interface Push buttons, Keypads, LED's, LCD, DAC's, real time clocks and other sensors to a PIC Microcontroller.
6. Develop an ability to write a code that will perform a task based on a word description of a problem.
7. Write an effective program for any PIC Microcontroller using Assembly Languages
8. Write an effective program for any PIC Microcontroller using C Languages
9. Develop an experience to debug a microcontroller-based system and to analyze its performance using debug tools.
10. Demonstrate how to develop, run, and experimentally validate code written in an assembly and C languages for a microcontroller system.
11. Develop skills to prepare effective written technical communications for engineering analysis and design work through lab and project reports.

Topics to be Covered:	***Duration in Weeks:***
1. Introduction to Computing, Embedded Systems, The PIC Microcontrollers: History and Features	1
2. PIC Architecture & Assembly Language Programming	1
3. Branch, Call, and Time Delay Loop	1
4. PIC I/O Port Programming	1
5. Arithmetic, Logic Instructions, and Programs	1
6. PIC Programming in C	1
7. PIC Timer Programming in Assembly and C	1
8. PIC Serial Port Programming in Assembly and C	1
9. SPI and I2C buses	1
10. Interrupt Programming in Assembly and C	1
11. LCD and Keyboard Interfacing	1
12. ADC, DAC, and Sensor Interfacing	1
13. CCP and ECCP Programming	1
14. Motor Control	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	x
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course: (d),(k)
Instructor or course coordinator: Dr. Mohamed Zarouan
Last updated: September 2013

EE 370: Biomedical Engineering Primer

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Engineering Primer	EE 370	370 هـ ك	3	3	-	4
Pre-requisites:	EE 306, BIO 321					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 470, EE 471, EE 472, EE 473, EE 474, EE 476, EE 477, EE 478, EE 479, EE 497			
Catalogue Description:						
Biomedical engineering fields of activity. Research, development, and design for biomedical problems, diagnosis of disease, and therapeutic applications. Modular blocks and system integration. Physical, chemical and biological principles for biomedical measurements. Sensors for displacement, force, pressure, flow, temperature, biopotentials, chemical composition of body fluids and biomaterial characterization. Patient safety.						

Textbooks:

1. Introduction to Biomedical Engineering (3rd Edition) by John Enderle & Joseph Bronzino Academic Press; 2012, ISBN: 978-0-12-374979-6

Supplemental Materials:

1. Webster, J. G. (ed), Medical Instrumentation: Application and Design, John Wiley and Sons, 4th ed. 2009, ISBN 978-0-471-67600-3
2. http://www.biopac.com
3. http://www.getbodysmart.com
4. Lecture Notes and PPTs

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. List the different fields of activities in which biomedical engineers may work to solve societal problems
2. Identify some of the professional societies and the professional status of biomedical engineering
3. Identify the modern moral dilemmas in professional ethics
4. Identify different types of potential hazards and how to proactively address patients safety in modern hospitals
5. Define bioelectric phenomena
6. Model some of the bioelectric phenomenon in the human body
7. Describe the electrodes that are used to record the biopotentials such as ECG, EEG, and EMG and those that are used for intracellular recordings.
8. Describe how displacement transducers, airflow transducers, and thermistors are used to make physical measurements
9. Explain the operating principles, advantages, and disadvantages of thermocouples, and RTDs
10. Describe the physical origin and characteristics of biosignals
11. Describe the basic bioinstrumentation system and the role of operational amplifiers and filters

12. List the standard diagnostic devices and describe their engineering principles
13. Define the behavior of light while propagating in biological tissue
14. List some of the applications of optics in biomedicine.

Topics to be Covered:	***Duration in Weeks:***
1. History of biomedical engineering	1
2. Ethics and moral values, and patient safety	1
3. Bioelectric phenomena	2
4. Biomedical sensors	2
5. Biosignal processing	2
6. Bioinstrumentation	2
7. Introduction to diagnostic imaging systems	2
8. Introduction to biomedical optics	2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (b)
Instructor or course coordinator: Dr. Umar S. Al-Qasemi
Last updated: September 2013

EE 372: Physiology For Biomedical Engineers

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Physiology For Biomedical Engineers	EE 372	372 هـ ك	2	2	-	3
Pre-requisites:	BIO 321					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 471			
Catalogue Description:						
Body environment, fluids and compartments, digestive system. Metabolism, energetics of glucose metabolism. Respiratory system and artificial respiration. Cardiovascular system and its regulatory mechanism, hemodynamics. Metabolism and body temperature regulation. Endocrinology, reproductive system and renal physiology.						

Textbooks:

1. Seeley's Essentials of Anatomy & Physiology (McGraw-Hill) – Hardcover (2012) by Cinnamon Regan Vanputte, ISBN: 0073378267

Supplemental Materials:

1. S.I. Fox, Human Physiology, 12 ed., McGraw Hill, 2010
2. http://highered.mcgraw-hill.com/sites/0072507470/student_view0/
3. http://www.biopac.com/
4. http://www.getbodysmart.com/
5. Lecture Notes and PPTs

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Describe in simple terms the normal function of the living organism in terms of its tissues, organs and systems individually and collectively.
2. Describe and discuss the concept of "Normal" and indicate the acceptable ranges for the different functions and functional limits of various systems of the human body under variable physiological conditions.
3. Describe the common factors that may maintain or change the normal functions within the normal range
4. Carryout simple experiments on human subjects or experimental animals or tissues, recording, graphing or tabulating his observations and results and reporting them accurately
5. Perform technical procedures unaided when presented with a programmed schedule of an experiment
6. Select appropriate sources of information for the promotion of his knowledge
7. Use the application of the physiological principles and concepts in his future medical technology practice.
8. Carryout simple tests on the functions of the human body or body fluids that are generally practiced in clinical laboratories
9. Describe the mechanism of the common laboratory equipment and instruments used in such experimental procedure
10. Describe metabolism, heat production and regulation in the body
11. Outline the structure and function of some senses

Topics to be Covered:	***Duration in Weeks:***
1. Introduction to human physiology	2
2. Autonomic Nervous system	1.5
3. Excitable Tissues	1.5
4. The Blood	1
5. Heart and circulation	1
6. Respiration	1
7. Gastrointestinal tract	1
8. Renal functions, micturition & acid base balance	1.5
9. Endocrine & Reproduction	1
10. Metabolism & Body Temperature	1.5
11. Special senses	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Mohammad A. Hussain

Last updated: September 2012

EE 374: Experimentation and Data Analysis in Health Care

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Experimentation and Data Analysis in Health Care	EE 374	374 هـ ك	3	1*	-	3
Pre-requisites:	BIO 321, STAT 110					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Descriptive statistics; elementary probability; discrete and continuous random variables and their distributions; hypothesis testing involving continuous and categorical (nominal and ordinal) variables, two and more treatments; linear regression; analysis of survival data. Design of clinical trials; sample size and selection of samples; selection and preparation of apparatus and preparing experimental protocols. Clinical standards for data collection, organization, summarization and verification; medical sample handling, transporting and disposal; sterilization, cleansing and hygiene. Applications of essential statistical techniques for use in analyzing data from different types of engineering experiments, biological experiments and clinical studies. Term project.						

*Includes a one-hour tutorial session

Textbooks:

1. W.W. Daniel, Biostatistics: A Foundation for Analysis in the Health Sciences, Wiley Series in Probability and Mathematical Statistics – Applied, 4th ed., John Wiley & Sons, 1987

Supplemental Materials:

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Distinguish between categorical variables and continuous variables, and select the appropriate graphic presentation for a set of data and generate the graph.
2. Construct frequency distributions and compute measures of central tendency (mean, median, and mode) and variability (variance, standard deviation).
3. Use the Gaussian and binomial and other distributions to assess the probability and uncertainty of health outcomes.
4. Construct and interpret moments and there applications .
5. Identify one random variables and two random variables and their distribution,
6. Perform and interpret one-sample, two-sample, and paired t tests on means, the normal theory two-sample test of proportions, the F test to compare two variances, and chi square tests of independence.
7. Compute correlation and covariance.
8. Compute and interpret Pearson product moment correlation coefficients.
9. Construct graphs, charts and tables to communicate the results of statistical analyses.
10. Define the random process and biomedical signals.

Topics to be Covered:	***Duration in Weeks:***
1. presentation of data (graphs and tables), and descriptive statistics,	1
2. concepts of probability, estimation of parameters, hypothesis testing,	1

3.	correlation, and the analysis of attribute data.	2
4.	Probability distribution and density functions	2
5.	expectation and moments for medical cases,	2
6.	two random variables and joint probability distribution and density functions ,	2
7.	correlation, covariance and correlation coefficients, and the analysis of clinical trial data.	1
8.	random process and biomedical signals,	1
9.	spectral analysis for random process and biomedical signals,	1
10.	linear systems and random process, applications of biomedical signals,	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Khaled O. Daqrouq

Last updated: December 2013

EE 390: Summer Training

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	***Pr.***	***Tr.***	***Total***
Summer Training	EE 390	390 هـ ك	-	-	40	2
Pre-requisites:	Passing 120 Credits of the Student's Plan + Any Additional Departmental Prerequisites					
Course Role in Curriculum	*Required or Elective:*		Required for the conventional program			
	A pre-requisite for:		-			

Catalogue Description:
10 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.

***Textbooks*:**
None

***Supplemental Materials*:**
None

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:

1. Formulate an objective statement that identifies the purpose of the training and describes the expected outcomes of the training activity.
2. Describe briefly s a professional work environment by identifying its organizational structure, production units, quality system, and its place on the market.
3. Exhibit integrity, punctuality, and ethical behavior in engineering practice and relationships.
4. Establish successful relationships with team members, advisors, and clients.
5. Maintain focus to complete important tasks on time and with high quality.
6. Relate practical work to previous knowledge from basic sciences, engineering fundamentals, and discipline related courses.
7. Collect and review related data such as technical information, regulations, standards, and operational experiences from credible literature resources.
8. Monitor achievement, identify causes of problems, and revise processes to enhance satisfaction.
9. Communicate, clearly and concisely, training details and gained experience, both orally and in writing, using necessary supporting material, to achieve desired understanding and impact

Topics to be Covered:	***Duration in Weeks***
1. Acquainting the trainee by the company, its work environment, organizational structure, products, costumers, engineering units, and quality system.	1
2. Familiarizing the trainee of one production or design unit with deep understanding of the work environment, regulations, standards, etc...	1
3. Allocating the trainee to a project team and allowing him to study and collect necessary data about the project using internal and external data sources.	1
4. Working as a team member to execute assigned tasks with the following objectives: • Apply engineering practices related to his specialization. • Enhance team work skills. • Relate practical work to his engineering knowledge. • Use modern engineering tools such as equipment and computer software. • Use project management techniques. • Develop personal communication skills.	7

Grading System

Assessment Tool	Percentage of the Total Grade	Passing Grade	Action if Not Passed
Company Evaluation Form	25%	15%	Repeat the training
Rubric of the Final Report	50%	30%	Resubmit the report
Oral Presentation Rubric	25%	15%	Repeat the presentation

Student Outcomes addressed by the course: (Put a **x** sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	**x**
(e)	an ability to identify, formulate, and solve engineering problems	**x**
(f)	an understanding of professional and ethical responsibility	**x**
(g)	an ability to communicate effectively	**x**
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	**x**
(i)	a recognition of the need for, and an ability to engage in life-long learning	**x**
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	**x**

Key Student Outcomes assessed in the course: (f) and (g)

Instructor or course coordinator: Dr. Ali H. Morfeq
Last updated: September 2013.

EE 470: Biomedical Signals and Systems

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Signals and Systems	EE 470	470 هـ ك	3	3	-	4
Pre-requisites:	EE 301, EE 370					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Models for biomedical systems. Non-deterministic nature of biomedical signals, physiological systems and quantitative analysis. Feedback systems, transfer functions and stability. Frequency response of systems and circuits, and Bode diagrams. A/D conversion, sampling, and discrete-time signal processing. Biomedical amplifiers, filters, signal processors and display devices. Laboratory and computational experiences with biomedical applications. Term project.						

Textbooks:

1. M. J. Roberts, Signals and Systems, Analysis Using Transform Methods and MATLAB, McGraw-Hill, International Edition 2004, ISBN 007-123268-0.

Supplemental Materials:

1. Michael C. K. Khoo, Physiological Control Systems: Analysis, Simulation, and Estimation, IEEE Press 2000, ISBN 0-7803-3408-6
2. John Enderle and Joseph Bronzino, Introduction to Biomedical Engineering, Academic Press, 3rd Ed. 2012, ISBN 978-0-12-374979-6
3. J. G. Webster, Medical Instrumentation: Application and Design, John Wiley and Sons, 4th Ed. 2009, ISBN 978-0-471-67600-3
4. My Webpage: http://www.kau.edu.sa/DRS-0009253.aspx

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Access information effectively and efficiently
2. Demonstrate ability to learn independently
3. Mathematically describe signals
4. Perform different mathematical manipulations on signals including scaling, shifting, differentiation, integration, and sampling
5. Build custom functions using combination of popular functions.
6. Solve differential equations to understand behavior of systems
7. Develop frequency response equation of a system from its Bode plot
8. Design reliable and relevant experiments to test biomedical systems
9. Conduct lab experiments
10. Analyze and interpret experimental data
11. Design of filters for biomedical applications
12. Model biomedical systems using differential equations
13. Identify and solve noise and distortion problems in biomedical systems
14. Apply different signals and systems analyses using MATLAB
15. Simulate biomedical systems using MATLAB Simulink
16. Use MATLAB tools to design analog and digital filters for biomedical applications

Topics to be Covered:	***Duration in Weeks:***
1. Introduction to signals and systems	1
2. Mathematical description of signals	2
3. Description and analysis of systems	2
4. The Fourier series	2
5. The Fourier transform	2
6. Analysis of Biomedical signals and systems using Fourier methods	2
7. Sampling and discrete Fourier transform	2
8. The z-transform and digital filters	2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	x
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	x
(i) a recognition of the need for, and an ability to engage in life-long learning	x
(j) a knowledge of contemporary issues	x
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course: (e),(h),(i),(j)
Instructor or course coordinator: Dr. Umar S. Al-Qasemi
Last updated: February 2014

EE 471: Biomedical Instrumentation

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Instrumentation	EE 471	471 هـ ك	2	3	-	3
Pre-requisites:	EE 312, EE 370, EE 372					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Electrical safety and precautions required in medical applications. Electrocardiography (ECG), analog and digital processing of ECG signals. Measurement of blood pressure, heart sound, flow and volume of blood. Statistical analysis of heart rate and blood pressure measurements. Basic respiratory system measurements. Principles of clinical lab instrumentation. Term project.						

Textbooks:

1. J.G. Webster (ed), Medical Instrumentation: Application and Design, 4th ed., John Wiley & Sons, 2009.

Supplemental Materials:

1. Prof John Webster's instrumentation website
2. J.J. Carr, and J.M. Brown, Introduction to Biomedical Equipment Technology, 3rd ed., Prentice-Hall, 1997.
3. Virtual Bio-Instrumentation: Biomedical, Clinical, and Health care Applications in LabVIEW. Prentice Hall
4. Handbook of Biomedical Engineering by J. Borzzino
5. Clinical Engineering Handbook by Dyro
6. IEEE Real world Engineering projects
7. Dr Nitish Thakor Biomedical Instrumentation course at Johns Hopkins University
8. Old EE471 Lecture notes by Prof. Bahattin Karagozuglu and Dr Haitham Alangary

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Describe techniques used to display, process, characterize, and analyze biosignals including ECG, EMG, and evoked potential
2. Design a noise-filtering instrumentation amplifier for amplifying low-level differential signals with high common mode voltages
3. Sketch and Describe block diagrams for a variety of medical devices used in hospitals (laboratory, therapeutic, blood pressue and blood flow measurements)
4. Develop the ability of self learning.
5. Choose sensors AND design instruments to monitor a physical phenomenum
6. Explain the concept of operation of multiple devices in the medical field
   Develop the ability to design instruments to satisfy specific needs
7. Recognize the principles of electrical safety and the potential hazards in the laboratory and clinical environments
8. Cooperate efficiently as a team member in completing laboratory projects
   Develop skills important for self learning such as problem solving and critical thinking.

Topics to be Covered:	***Duration in Weeks:***
1. Biopotential amplifiers	2.5
2. Blood pressure and sound	2
3. Measurement of blood flow and volume	2
4. Measurements of the respiratory system	1
5. Electrical safety	1.5
6. Introduction to therapeutic devices	1.5
7. Clinical laboratory instrumentation	1.5
8. Chemical biosensors	1
9. Term projects and their presentations	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	x
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Nazeeh S. Alothmany

Last updated: September 2012

EE 472: Biomedical Imaging Systems

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Imaging Systems	EE 472	472 هـ ك	3	1*	-	3
Pre-requisites:	EE 302, EE 370					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Fundamentals of medical imaging physics and systems: X-ray radiography, ultrasound, radionuclide imaging, and magnetic resonance imaging (MRI). Biological effects of each modality. Tomographical reconstruction principles, including X-ray computed tomography (CT), position emission tomography (PET), and single-photon emission computed tomography (SPECT).						

*Includes a one-hour tutorial session

Textbooks:

1. K.K. Shung, M.B. Smith, and B.M. Tsui, Principles of Medical Imaging, Academic Press Inc. 1992

Supplemental Materials:

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Define the concepts of resolution, point-spread-function, line-spread-function, modulation transfer function, signal-to-noise level, and contrast-to-noise level as they apply to images.
2. Differentiate between characteristic and general radiation, and describe their effects on image quality.
3. Apply the concept of back projection and iterative schemes for data reconstruction, and the progression of first, second, third, fourth and fifth generation computed tomography scanners.
4. Explain basic principles of nuclear medicine, single photon emission computed tomography, and positron emission tomography, including the origin and detection of natural radioactivity, and the relevance of half-lives.
5. Explain the effect of putting protons inside a magnetic field, the principles discrete energy levels, and the Boltzmann equation relating the populations of quantum energy levels.
6. Express the interactions of the magnetic field produced by a radiofrequency probe and the nuclear spins, the induced precession and the process to give rise to the NMR signal.
7. Recognize the techniques for measuring spin-lattice and spin-spin relaxation times, the principles behind frequency encoding, phase encoding, and slice selection in magnetic resonance imaging, and the full implementation of both spin-echo and gradient-echo imaging sequences.
8. Express the basic principles of ultrasound, including longitudinal waves, the characteristic acoustic impedance (Z), the intensity reflection coefficient (R), and the basic principles of attenuation of the ultrasound wave - scattering, refraction and absorption.
9. Describe the instrumentation used in clinical ultrasound scanning including the

transducer, improving transducer efficiency, time-gain compensation, and positioning as well as the geometry of the ultrasound beam and its dependence on the properties of the transducer; explain the characteristics of lateral and axial resolution and what factors affect them.

10. Describe principles and applications of fluoroscopy, catherization and angiography.

Topics to be Covered:	***Duration in Weeks:***
1. Fundamentals of medical imaging physics and systems	1
2. X-ray radiography	2
3. Ultrasound	2
4. Radionuclide imaging	2
5. Magnetic resonance imaging (MRI)	2
6. Biological effects of each imaging modality	1
7. Tomographical reconstruction principles	3
8. Principles of fluoroscopy, catherization and angiography	2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	x
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	x
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (f)
Instructor or course coordinator: Dr. Prahlad K. Rao
Last updated: February 2014

EE 474: Safety, Reliability and Maintenance in Health Care

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Safety, Reliability and Maintenance in Health Care	EE 474	474 هـ ك	3	1*	-	3
Pre-requisites:	EE 370					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Definition of safety. Electrical, gas, and fire safety and how to make safe environment for patients, medical personnel and attendants. Reliability in health care facilities. Training of operators for proper use of equipment. Generation of a computer database for equipment, suppliers, dealers and manufacturers. Preventive maintenance procedures. Corrective maintenance, repair and amendment of existing equipment. Basic troubleshooting principles. Retrieving information from manufacturer's catalogs and technical libraries.						

*Includes a one-hour tutorial session

Textbooks:

1. No particular text book is followed. Lecture notes and actual references are used

Supplemental Materials:

1. Yadin D (Editor), J.D. and Neuman M.R. Clinical Engineering (Principles and Applications in Engineering), CRC Press; 2003.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Recognize national and international standards for healthcare safety and reliability (f)
2. Understand what is Safety and Reliability and the roles of engineers in them
3. Understand the role of preventive and corrective maintenance have in affecting safety and reliability in hospitals
4. Develop a hospital Organization chart and identify the roles of engineers on it
5. Prepare policies, procedures and maintenance documents to comply with national and international safety and reliability standards(g)
6. Estimate failure rates of medical equipment and plan maintenance services accordingly (b, e, l)
7. Formulate an optimum the spare and repair parts storage to minimize the downtime of equipment (f, h)
8. Design processes to verify safety in medical environment (b, f, h, k)
9. Coordinate and work as a member of a maintenance team (d)
   Describe the ethical, moral, financial, social impact of engineering activites on patients, visitors, staff and contractors.

Topics to be Covered:	***Duration in Weeks:***
1. Definition of safety	1
2. Hospital Organization Charts and the roles of engineers on them	1.5
3. Electrical, medical gas, and fire safety and how to make safe environment for patients, medical personnel and attendants.	1
4. Reliability in health care facilities.	1

5. Training of staff to meet standards. 1
6. Design and layout medical facilities, defend the choice of proximity of departments to each other (c, g, p) (H) 1.5
7. Corrective maintenance, repair and amendment of existing equipment. 1
8. Local and international Standards for safety and reliability. 2
9. Retrieving information from agencies that have safety and relaibilty standard. 1
10. Developing policies and procedures to comply with standards 2
11. Moral and Ethical Impact of engineering tasks and solutions on staff, patients, visitors, contractors, etc. 1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	x
(j) a knowledge of contemporary issues	x
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Abdulhameed F. Alkhateeb

Last updated: June, 2014

EE 475: Biomolecular Engineering (Elective)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomolecular Engineering	EE 475	475 هـ ك	3	1*	-	3
Pre-requisites:	BIO 321					
Course Role in Curriculum	*Required or Elective:*		Elective			
	A pre-requisite for:					
Catalogue Description:						
Thermodynamics, biomolecular interactions, enzyme kinetics and bioenergetics. Biodesign, molecular modeling and case studies. Cellular warfare, bioreaction networks. Application examples and term project.						

*Includes a one-hour tutorial session

Textbooks:

1. Molecular Cell Biology by H. Lodisch et al W.H.Freeman and Co., 2004.
2. Essential Biochemistry by Charlotte W. Pratt, Kathleen Cornely, Wiley Interscience, 2010
3. Bioinformatics: Sequence and Genome Analysis by David W. Mount, Cold Spring Harbor Laboratory Press, 2004.

Supplemental Materials:

1. http://www.wiley.com/college/pratt/0471393878/student/index.html
2. Lecture Notes and PPTs

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Understand and relate basics of genomics and proteomics
2. Describe central dogma including replication, transcription and translation
3. Demonstrate knowledge of current NCBI suite of biological databases relevant to structure and function of DNA and proteins
4. Understand working principles of common equipments used in genetic engineering pursuits
5. Describe Energetics of Biological Systems
6. Understand hydrophobicity/ hydrophilicity of a surface based on water contact angle to appreciate biomolecular compatibility of a surface
7. Describe Enzymes as Biological Machine and understand Enzyme Activation
8. Describe photolithographic techniques
9. Understand molecular anchoring and immobilization of functional biomolecules on surfaces for nanosensor design and development
10. Become familiar with DNA/protein Array Technology and Biochips
11. Describe Biomolecular Machines such as nanorobots and pharmacytes
12. Understand the concept of biomolecular engineering in designing/improving biomaterial surfaces for specific biomedical applications

Topics to be Covered:	***Duration in Weeks:***
1. Tools and Techniques of Molecular Biology: (an Engineers perspective)	4
2. Bioenergetics and Biomolecular Interactions at solid-liquid interface	2
3. Enzyme Kinetics	2

4. Nanofabrication and Surface Modification 3
5. Biomolecular Machines and other Applications 2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Mohammad A. Hussain

Last updated: September 2012

EE 476: Biomedical Systems Management (Elective)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Systems Management	EE 476	476 هـ ك	3	1*	-	3
Pre-requisites:	IE 256, EE 370					
Course Role in Curriculum	*Required or Elective:*		Elective			
	A pre-requisite for:					
Catalogue Description:						
Responsibilities of biomedical engineers working in health-care facilities. Codes, standards and regulations governing clinical engineering practices. Bids preparation and tender evaluation. Designing and layout of medical facilities. Equipment selection and evaluation. Term project.						

*Includes a one-hour tutorial session

Textbooks:

1. Bronzino J.D. (Editor), Management of Medical Technology: A Primer for Clinical Engineers, Butterworth-Heinemann; 1992.
   Several refernces will be used as necessary

Supplemental Materials:

1. Bronzino J.D. (Editor), Management of Medical Technology: A Primer for Clinical Engineers, Butterworth-Heinemann; 1992.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Identify roles and responsibilities of biomedical engineers and defend positioning biomedical engineers in advanced tasks (d, e, f, h, i, j, p) (M, L for p)
2. Understand national and international standards, and their applications to health care facilities (f) (M)
3. Transform regulations (local and international) governing biomedical engineering practices into policies and procedures (f, g, j) (M)
4. Recognize main organizations that have codes for biomedical engineering (f, g) (L)
5. Design and layout medical facilities, defend the choice of proximity of departments to each other (c, g, p) (H)
6. Use software packages like AUTOCAD and MS ACCESS (k) (M)
   Generation of a computer database for equipment, suppliers, dealers and manufacturers. Preventive maintenance procedures. 1.5
7. Select and evaluate medical equipment for a specific application (c, e, p) (H)
8. Managing the decision process for selecting modalities, sizing, specifying and preparing request for quotation (RFQ) and bill of quantity (BOQ) (c, d, e, g) (M)
9. Prepare bid and evaluate tender (e, g) (M)
10. Develop processes for receiving, managing and discarding medical equipment (c, e) [H].
11. Work effectively as a member of biomedical system, facilities design and management team. (d, f) [M]

Topics to be Covered:	***Duration in Weeks:***
1. Responsibilities of biomedical engineers working in health-care facilities.	2
2. Codes, standards and regulations governing clinical engineering practices.	2
3. Bids preparation and tender evaluation.	2
4. Designing and layout of biomedical facilitiesdepartment.	21
5. Equipment selection and evaluation process.	2
6. Developing a database to manage biomedical engineering department	2
7. Ethical, moral, financial and social impact of biomedical engineers actions or inactions	2
8. Term project.	2

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:

Instructor or course coordinator: Dr. Abdulhameed F. Alkhateeb

Last updated: June 2014

EE 490: Special Topics in Electrical Engineering (Elective)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Special Topics in Electrical Engineering	EE 490	490 هـ ك	3	1*	-	3
Pre-requisites:	Approval of the ECE Department					
Course Role in Curriculum	*Required or Elective:*		Elective			
	A pre-requisite for:					
Catalogue Description:						
Selected topic to develop the skills and knowledge in a given field.						

*Includes a one-hour tutorial session

Textbooks:

1. Entrepreneurship, William D. Bygrave, Andrew Zacharakis, Wiley, 2nd Edition 201, 978-0-470-91192-1

Supplemental Materials:

1. Steve Mariotti, Caroline Galkin, Entrepreneurship: Starting and operating a small business, second edition , Prentice Hall. ISBN 978-0-13-236600-7
   Course notes, and publications on Entrepreneurship.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Apply effective written and oral communication skills to business situation
2. Analyze the local business environment
3. Use critical thinking skills in business situations
4. Apply an ethical understanding and perspective to business situations.
5. Apply Engineering knowledge in creating a business.
6. Generate a creative approach to problem solving.
7. Apply Leadership and team-building skills in business environment.
8. Recognize the developmental process, and how to be successful in effectuating change

Topics to be Covered:	***Duration in Weeks:***
1. Know yourself, Invention, Innovation, and creativity in business and engineering, sense of belonging	1.5
2. Starting a Business, Finding a Niche/Differentiation, Corporate Culture, Financing, Legal and Regulatory Issues.	1.5
3. Fundamental engineering economics, time value of money, Cost calculation	2
4. Marketing Goals, The Marketing Plan, The Marketing Mix, The Marketing Budget, Marketing Implementation, Technology and Marketing	2
5. Entrepreneurial management, project management, Technology transfer, technology commercialization	1.5
6. Fundamentals of Communication skills, Knowing the Audience, The Power of Listening, Credibility of the Speaker, Evidence in Persuasion, Emotion in Persuasion, Organizing the Argument	2
7. is a Leader?, Sources of Power in Leadership, Leadership Theories, Transformational Leaders, Decision-Making and Empowerment, Accountability	1.5
8. Business Plan, Development of a Business Plan, Sections of a Business	2

Plan, Financial Projections, Common Mistakes

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course:
Instructor or course coordinator: Dr. Mohammed N. Ajour
Last updated: February 2014

Part II: The Courses from Other Engineering Programs

DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS
IE 200: Technical Communication Skills

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Technical Communication Skills	IE 200	هـ ص 200		10		2
Pre-requisites:	ELI 104					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Communication skills: art of listening, tools of in-depth reading, information gathering, analyzing, and criticizing; electronic means of communication. Writing skills: writing strategies, general versus technical writing, technical report writing. Presentation skills: use of spoken English, professional computer-based oral presentations. Project-based course work on technical communication.

***Textbooks*:**
(Author, Title, Pub., year)
TLSU Team (2012), Face to Face with Basic Research & Communication: A Process & Project-Based Course.

***Supplemental Materials*:**
1. Markel, Mike (2006), Technical Communication. (Teacher Reference).
2. Woolever (2002), Writing for Technical Professions. (Teacher Reference).
3. Svobodva et al. (2000), Writing in English: A Practical Handbook for Scientific and Technical Writer. (Teacher Reference).

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:
1. Describe the course design, rules and regulations
2. Identify elements of report writing and research components
3. Write a research proposal dealing with one contemporary issue
4. Write down a clear and concise introduction that defines the problem and forecasts the work to be carried out.
5. Communicate ideas orally while keeping the audience engaged
6. Access information from a varity of sources and critically assess their quality, validity and accuracy
7. Analyze and present data in a meaningful way
8. Interpret data
9. Use reliable and credible citations to support the credibility and authenticity of the information presented.
10. Demonstrate knowledge of terminology and research process and ability to reflect upon the learning experience
11. Demonstrate integrity, punctuality, enthusiasm and active class participation.

Topics to be Covered:		***Duration in Weeks***
1.	Orientation	1
2.	Introduction to research and report writing	1
3.	Research proposal	1
4.	Writing technical Introduction	1
5.	Oral presentation skills	1
6.	Data Collection Methods	2
7.	Data Analysis	2
8.	Discussions and Conclusions	2
9.	Referencing and citations	1
10	Reflection upon learning	1
11.	Professional behavior	1

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	√
(g)	an ability to communicate effectively	√
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	√
(i)	a recognition of the need for, and an ability to engage in life-long learning	√
(j)	a knowledge of contemporary issues	√
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (g) (i) and (j)

Instructor or course coordinator: Dr. Mohammad Chaudry
Last updated: May 2014

DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS
IE 201: Introduction to Engineering Design I

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Introduction to Engineering Design I	IE 201	**201 هـ ص**	-	6	-	3
Pre-requisites:	ELI 104, COMM 101					
Course Role in Curriculum *(Required/Elective):*	Required					

Catalogue Description:
Introduction to active learning: team work, team dynamics, team norms and communication, conducting effective meetings and quality assessment. Problem solving procedure: problem definition, generation of solutions, selection methodology, solution implementation, assessment of implementation. Levels of learning and degrees of internalization. Ethical decision. Organization of the work and design notebook. Reverse engineering and design projects.

***Textbooks*:**
(Author, Title, Pub., year)

1. STRATEGIES FOR CREATIVE PROBLEM SOLVING, Fogler, H.S., LeBlanc, S., E.,, 2th Ed., 2007, Prentice Hall PTR ISBN 978-0130082794
2. INTRODUCTION TO ENGINEERING DESIGN, McNeill, B. W., Bellamy, L., Burrows, V. A.,2004, King Abdulaziz University Press

***Supplemental Materials*:**

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Develop and exhibit the behaviors associated with taking personal responsibility for time management, classroom expectations, professional and ethical behaviors in the class, and academic integrity, etc
2. Practice elements of active learning as well as apply active learning techniques such as Engineering Journal, Facilitator Signal, Process Check
3. Explain quality, costumer, expectations, and process as well as demonstrate the ability to meet customer expectations.
4. Develop team norms.
5. Use effective teams tools such as team agenda, minutes and team process check as well as team dynamics tools such as maintenance phase.
6. Use team discussion tools such as Boogle method, affinity process, deployment flowchart, multi-voting and prioritization techniques.
7. Explain problem solving strategies such as using heuristic, perceiving problems, potential problem, real problem, etc.
8. Explain problem definition techniques such as exploring the problem, present state/desired state, Dunker diagram, statement restatement, KT Problem Analysis and apply them on semester design project.
9. Explain idea generation techniques such as Osborn's Checklist, random stimulation, fishbone diagram as well as apply them on semester project.
10. Explain situation analysis, problem analysis, decision analysis, potential problem analysis and apply these techniques on semester design project.

11. Explain planning components such as Gantt chart, deployment chart and critical path management and apply them on semester design project.
12. Explain ethical issues, safety considerations, and environmental, social and cultural impact and evaluate them on semester design project.
13. Demonstrate the fundamentals of organizing and presenting technical work using modern engineering tools in their written and oral presentation
14. describe their chosen field of engineering as well as identify other fields of engineering
15. Explain stages of level of learning (LOL) and degree of internalization (DOL) and apply them on example
16. use organization techniques such as book keeping (Design Notebook), using checklist, etc
17. search and collect information and rearrange it for a given topic

Topics to be Covered:		***Duration in Weeks***
1.	Learning Culture	2
2.	Quality	2
3.	Teaming	2
4.	Creative Problem Solving	4
5.	Engineering The Profession and Communication	2
6.	Autonomous Learner	2

Key Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	√
(d)	an ability to function on multidisciplinary teams	√
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	√
(g)	an ability to communicate effectively	√
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	√
(i)	a recognition of the need for, and an ability to engage in life-long learning	√
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (c), (f) and (k)

Instructor or course coordinator: Dr Ahmed Z. Salem (c), Mohammad Rehan Maqbool
Last updated: 02-02-2014

DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS
IE 202: Introduction to Engineering Design II

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Introduction to Engineering Design II	IE 202	هـ ص 202		4		2
Pre-requisites:	IE 200, IE 201					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Engineering design process. Computer modeling and heuristics for problem solving. Hands-on real life and team–based engineering design project: customer requirements, conceptual design, prototyping, functional testing, preparation of operational manual. Communicating design outcomes.

***Textbooks*:** (Author, Title, Pub., year) Clive L. Dym and Patrick Little, Engineering Design, a Project-Based Introduction, Third Edition, John Wiley and Sons, Inc., NJ, USA, 2009.

Supplemental Materials: Course Notes: First day materials, Course project, Guide to assignments

Course Learning Outcomes:

By the completion of the course the students should be able to:

1. Describe the nature of engineering design and the roadmap of the design process as a response to the conflicting interests of different stakeholders.
2. Devise an effective work plan with manageable subtasks, resources, and timelines using standard project planning techniques to ensure project completion on time and within budget.
3. Define the problem and identify design attributes, objectives, metrics, and constraints by integrating customers' needs, applicable realistic constraints and data collected from multiple credible sources of information.
4. Transform customer needs, objectives, and attributes into design requirements by identifying design functions, means of realization and performance specifications that demonstrate successful functional behavior.
5. Generate possible solutions and compare alternatives to select a baseline design based on solid evaluation criteria and feasibility analysis.
6. Integrate prior knowledge of science and mathematics with engineering principles, heuristics, modern engineering tools, and modeling techniques to analyze, estimate performance, and optimize design solutions
7. Plan and execute effective manufacturing and testing procedures to produce a proof of concept working prototype.
8. Document and communicate details of the design process and express thoughts clearly and concisely, both orally and in writing, using necessary supporting material, to achieve desired understanding and impact.
9. Achieve project objectives using independent, well organized, and regularly reported multidisciplinary team management techniques that integrate, evaluate, and improve different skills of team members.

Topics to be Covered:		***Duration in Weeks***
1.	Course Norms - Working within Multidisciplinary Teams	0.5
2.	Introduction - The Design Process	0.5
3.	Problem Definition	1
4.	Objectives & Constraints	1
5.	Functions & Requirements	1
6.	Alternative Designs	1.5
7.	Evaluation & Selection	1.5
8.	Project Management	1.5
9.	Modeling, Analysis, and Optimization	1.5
10	Prototyping	2
11.	Testing & Design Specifications	1
12.	Communication Skills	1

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	√
(d)	an ability to function on multidisciplinary teams	√
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	√
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (c) and (g)

Instructor or course coordinator: Dr. Ibrahim Olwi
Last updated: May 2014

DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS
IE 255: Engineering Economy

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Engineering Economy	IE 255	255 هـ ص	3	1	0	3
Pre-requisites:	MATH 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Fundamentals of engineering economy. Time value of money. Evaluation of alternatives. Replacement and retention analysis. Break even analysis. Depreciation methods. Basics of inflation.						

***Textbooks*:** (Author, Title, Pub., year) Blank, Leland T. and Tarquin, Anthony J., Basics of Engineering Economy, 1ST Ed., McGraw-Hill, 2008, ISBN 9780071287623.

***Supplemental Materials*:** Course Notes in IE255 Coordinator's web page: Course outline, Course project, Homework, Old exams and Booklets for formulas and tables.

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Apply the fundamentals of engineering economy and the basic principles of the time value of money.
2. Draw the cash-flow diagrams (CFD).
3. Identify and compare different interest rates i.e., simple, compound, MARR, ROR, nominal and effective.
4. Compute equivalent values for time based cash flows of varying complexities.
5. Compare economic alternatives based on equivalent present worth (PW), future worth (FW), capitalized cost (CC), payback period (PbP), annual worth (AW) values and Benefit cost ratios (B/C).
6. Compute the internal rate of return (IRR) and evaluate an economic alternative on the basis of IRR.
7. Make analytical decisions by replacement and breakeven analysis of different projects / alternatives and analysis under uncertain conditions.
8. Compute the Present worth by considering the effects of inflation.
9. Estimate and allocate cost and apply capital budgeting.
10. Compute depreciations related to machines / projects using straight line (SL), Declining Balance (DB) and Double Declining Balance (DDB) method.
11. Apply the fundamentals of engineering economy and the basic principles of the time value of money.

***Topics to be Covered*:**	***Duration in Weeks***
1. Foundations of Engineering Economy	1
2. How Time and Interest Affect Money	2.5
3. Nominal and Effective Interest Rate	2

4.	Present Worth Analysis	2
5.	Annual Worth Analysis	1.5
6.	ROR Analysis	0.5
7.	Benefit/Cost Analysis	0.5
8.	Breakeven and Payback Analysis	1
9.	Replacement Decisions	1
10.	Inflation Impacts	0.5
11.	Cost Estimation	1
12.	Depreciation	0.5

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (e) and (k)

Instructor or course coordinator: Eng. Mohammed Abdullah Alharkan
Last updated: June 2014

DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS
IE 256:Engineering Management

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Engineering Management	IE 256	256هـ ص				3
Pre-requisites:	IE 202 and IE 255					
Course Role in Curriculum	*Required or Elective:*		Elective			
	A pre-requisite for:					
Catalogue Description: Role of engineers in management of organizations. Managerial functions related to production, inventory and human resources. Project planning and control. Case studies pertaining to engineering problems.						

***Textbooks*:**

Chuck Williams, MGMT, Sixth Edition, South-Western, Cengage Learning, OH, USA, 2014

***Supplemental Materials*:**

Course Notes, Case Studies, Handouts

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Apply knowledge of math, science and engineering in engineering management.
2. Work efficiently in teams
3. Use the techniques, skills, and modern engineering tools necessary for basic engineering management practices
4. Work on and understand case studies
5. Communicate effectively in written/oral communication skills
6. Use managerial skills in engineering

***Topics to be Covered*:**

1. Management – Ch1
2. History of Management – Ch2
3. Forms of Business - Handouts
4. Ethics & Social responsibility – Ch4
5. Planning & Decision Making – Ch5
6. Designing Adoptive organization – Ch9

7. Motivation – Ch13
8. Finance – Handouts
9. Project Management - Handouts

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	√
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (a) and (e)
Instructor or course coordinator: Dr. Ayman A Hashem
Last updated: December 2013

DEPARTMENT OF MECHANICAL ENGINEERING
PRODUCTION AND MECHANICAL SYSTEMS DESIGN PROGRAM
COURSE SYLLABUS
MENG 102: Engineering Graphics

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Engineering Graphics	MENG 102	102 هـ مك	1	5	-	3
Pre-requisites:	**None**					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Introduction: Skills of freehand sketching. Methods of projection: orthographic, isometric. Dimensioning of views. Third view prediction. Primary and successive auxiliary views. Intersections of surfaces and bodies. Development of surfaces. Sectioning. Introduction to assembly drawings. Steel sections. Standards and conventions. Computer Aided Graphics using SOLIDWORK crafting package. Applications

***Textbooks*:** - Exercise sheets by courseteam, K.A.U, 2014
(Author, Title, Pub., year)

Supplemental Materials: - Online SolidWorks Tutorial 2012
- Online Tutorials on YouTube by course team, 2014

Course Learning Outcomes:

By the completion of the course the students should be able to:

1. Develop 3D solid models using modern engineering 3D software, through:
   1.1 Using sketching commands and entities relationships,
   1.2 Using Extrude and Extrude Cut Commands,
   1.3 Using Revolve and Revolve Cut Commands,
   1.4 Using 3D sketch Commands,
   1.5 Using Sweep and Sweep Cut Commands,
   1.6 Using Loft and Loft Cut Commands,
   1.7 Using Assembly Commands to assemble several parts to create 3D assembled Models.
2. Use Drawing Sheet Commands to create:
   2.1 Orthographic and auxiliary views in 2D working drawings sheets.
   2.2 Section views in 2D working drawings sheets.
3. Conclude 3D models out of 2D models.
4. Use Sheet Metal Commands needed to develop sheet metals models.

Topics to be Covered:	***Duration in Weeks***
1. Introduction, Sketching commands	1
2. Sketching, entities relationships commands	1

3.	Extrude and extrude cut commands	2
4.	Drawing sheet, dimensioning and sectioning commands	2
5.	Concluding 3D models out of 2D drawings	3
6.	Assembly commands and Toolbox	1
7.	Revolve and revolve cut commands	1
8.	3D sketch and sweep commands	1
9.	Loft and loft cut commands	1
10.	Sheet Metal commands	1

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	√
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	√
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Key Student Outcomes assessed in the course: (g), (i) and (k)

Instructor or course coordinator: Dr. Haitham A. Bogis
Last updated: Spring 2014

Part III: Courses fromother KAU Faculties

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ARABIC LANGUAGE
COURSE SYLLABUS
ARAB 101: Arabic Language (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Arabic Language (1)	ARAB 101	101 عرب	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
The main focus of this course is to improve students' vocabulary, grammar and reading skillsthrough in-class learning activities and self-study. The course aims to give students a firmgrounding in the basic language structure by covering syntax, word morphology, spellingand punctuation. The course also focuses on how students can become effective writersand editors by evaluating their own writing.

***Textbooks*:**
1. Salem S. Al-Khammash (2008) Arabic Language skills, Jeddah, King Abdulaziz University,Centre for Scientific Publications. (In Arabic)

***Supplemental Materials*:**
1. Mohammad S. Al-Shanti (1994) Arabic Language skills, Dar Al-Andalous, Hail, Saudi Arabia.(In Arabic).

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Communicate simply but effectively in Arabic
2. Appreciate the importance of Arabic for personal enrichment and professional success
3. Gain knowledge of basic grammatical and sentence structures.
4. Distinguish and pronounce all Arabic alphabet and sounds.
5 Demonstrate accurate spelling by writing from dictation
6. Write accurately from dictation.
7. Recognize and use properly ancient and modern dictionaries to look up words and meanings.

***Topics to be Covered*:**		***No. of Weeks***
1	Importance of learning Arabic / language & communication / Importance of Reading	1
2.	Basic grammatical rules: Syntactic rules: Parts of speech / Case: The dynamic (Mu'rab) & Indeclension (Mabni)	1
3.	Nouns & Pronouns / Enclitic Pronouns Grammatical cases	1
4.	Overt verbs	1
5.	The Imperfective Tense / Strong, sick and imperfective verbs (five verbs)	1
6.	The Dual & Plural / Unnonated Nouns Types of declension Diptotes & Triptotes	1

7.	Subject & Predicates / Weak verbs	1
8.	The doer / The Accusative object	1
9.	Subject of the predicate	1
10.	Morphology / auxiliary consonants	1
11.	Plural & dual formation / Spelling rules for ‘Hamza’ (medial & final)	1
12.	Types of ‘Hamza’/ Punctuation rules	1
13.	Texts & Dictionaries	2

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ARABIC LANGUAGE
COURSE SYLLABUS
ARAB 201: Arabic Language (2)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Arabic Language (2)	ARAB 201	201 عرب	3			3
Pre-requisites:	ARAB 101					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: This curriculum aims to make deep instructor of Linguistic knowledge (dictionary) and grammatically and morphological and rhetoric , for students and developing the sense of Arts at them, and methods of formulating and Arabic editing, and ability to use the modern technical educational aids, and to practice on them through the selection texts not through the direct delivery.						

***Textbooks*:**

1. Dr. Hamdan Bin Atteyah, Alzahram. Dr. Fahad Bin Mused Alluhibi,and Dr. Saeed Bin Tayeb Almutrifi, "Arabic Editing $_2$nd level", King Abdulaziz University.

***Supplemental Materials*:**

1.

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Demonstrate the language skills necessary for Arabic language speaking, reading and writing, and demonstrate that the student has strong relation with his Arabic Culture and civilization.
2. Demonstrate ability to write story, play, and oratory
3. Prepare official speaking.
4. Demonstrate ability to benefit from modern technology in writing.

***Topics to be Covered*:**

1. **First Unit : Text Constructions Elements**
   - Vocabulary and Reading text.
   - Text Construction Elements- pronunciation- sentence – paragraph-connection articles.
   - Office and Management writing (report, management message, minutes, autobiography)
2. **Second Unit: Types of Office Writing**
   - Autobiography: Its need and its importance, selecting the data, way of its arrangement.
   - Management Message: its need, its important, its frame (design and concept) Message Language and its dialect, the grammar that must consider in writing, pattern for Management messages.
   - Report: its importance, its field, its purpose, and how to write it.
   - Minutes (record) what it is, the skills that must be available in the

record writers.

3. **ThirdUnit:Type of Arts Writing**
    - Essay
    - Idea (notion)
    - Story
    - Play
4. **Fourth Unit:Writing &Search**
    - Search
    - Summary
    - Punctuation Mark.
    - Common Mistake in writing.
    - Writing and internet.
    - Samples and Applying
5. **Fifth Unit : Rhetoric**
    - From Rhetoric: simile ,hidden metaphor ,implied metaphor
    - From Rhetoric: Antithesis , paronomasia , equivocation ,
    - Samples & applying.

FACULTY OF SCIENCES - DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE SYLLABUS
BIO 110: General Biology (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Biology (1)	BIO 110	110 أح	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Getting Acquainted with Biology- What is Biology \ Branches of Biology-Historical Developmentof Biology-Characteristics of Life-How Biological studies Are Conducted-Applicationsof Biology \ Relations with other Sciences-Careers for Biology Majors-Chemical Basis ofLife-Inorganic Components of Living Organisms-Organic Components of Living Organisms-Biological Reactions and Enzymes-Cells and Tissues: Structure and Functions – ProkaryoticCells-Eukaryotic cells-Replication of cells: Mitosis and Meiosis-Plant and Animal Tissues-Biodiversity-Principles of Taxonomy and Classification-Viruses, Bacteria, Algae and Fungi-Plants-Animals-Nutrition- Metabolism and Bioenergetics-Photosynthesis: Fixation of SunEnergy-Synthesis of Biological Macromolecules, Energy Storage-Breakdown of BiologicalMacromolecules, Energy Release- Excretion-Excretion in Simple Forms of Life-Excretionin Plants-Excretion in Animals-Respiration-Circulatory System-Blood: Composition & Functions-Heart & Vessels-Lymph & Lymphatic System-Reproduction, Fertilization and Development-Simple Forms of Life-Plants- The Basic Genetic Mechanisms-ClassicGenetics-Molecular Genetics.

***Textbooks*:**
1. Campbell, Reece, Taylor, Simon, and Dickey. BIOLOGY: Concepts & Connections, Sixth Edition.2009

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate knowledge of Life Sciences and their vital applications in many life aspects
2. Appreciate the role of Life Sciences in solving out more global issues and man-current issues (e.g. global warming)
3. Demonstrate ability to develop general initiative and problem solving skills, which would improve his intellectual ability to choose the career that meets with his skills.
4. Apply the scientific methods for experimentation and analysis by English language, which would improve his reading, written, interpreting and presentational communication skills.

***Topics to be Covered*:**
1. Getting Acquainted with Biology
2. Chemical Basic of Life
3. Cells And Tissues
4. Biodiversity

5. Metabolism and Bioenergetics
2. Nutrition
8. Gas exchange (respiratory) and Circulation
9. Excretion
10 Reproduction , Fertilization and Development
11 Basic Genetic Mechanisms

COURSE SYLLABUS
BIO 321: Biology for Biomedical Engineers

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biology for Biomedical Engineers	BIO 321	321 أح	2	3	-	3
Pre-requisites:	CHEM 281					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:		EE 370, EE 372, EE 374			
Catalogue Description:						
Introduction to biology, tissues, cells and chemistry of life. Skeleton, joints, muscles. Nervous system, it's organization, division and functions, sense organs. Processing of food. Basic anatomy and physiology of cardiovascular, lymphatic, respiratory and urinary systems.						

Textbooks:
1. S. S. Mader and M. Windelspecht, *Human Biology*, 12th Ed., McGraw-Hill, 2012.

Supplemental Materials:
1. S. I. Fox, *Human Physiology*, 7th Ed., McGraw-Hill, 2001.

Topics to be Covered:	***Duration in Weeks:***
1. Introduction of biology	2
2. Chemistry of life, Cell, Tissues	3
3. Nervous system, it's organization, division and functions, Sense organs	2
4. Processing of food	1
5. Basic anatomy and physiology of : Cardiovascular system	2
6. Lymphatic system	1
7. Respiratory system	1
8. Urinary system	1
9. Muscles	1

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	

(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	x

Key Student Outcomes assessed in the course:
Instructor or course coordinator: Dr. Muhammad S. Alghamdi
Last updated:

FACULTY OF SCIENCES - DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
CHEM 110: General Chemistry I

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Chemistry I	CHEM 110	110 كم	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
It provides an introduction to the general principles of chemistry for students planning a professional career in chemistry, a related science, the health professions, or engineering. By the end of this course the student will be able to understand the following: Significant figures, scientific notation and units, stoichiometry, atomic structure & periodic table, chemical bonding, gases, ionic equilibrium, basic principles of organic and basic principles of biochemistry.

***Textbooks*:**
1. Chemistry, by Chang, 9th. ed., 2007, McGraw-Hill.
2. Chemistry, by Steven S. Zumdahl, 6th ed., Houghton Mifflin, College Div.

***Supplemental Materials*:**
1. Chemistry, by Mortimer, 6th ed., Wadsworth Inc.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate understanding of Significant figures,
2. Demonstrate understanding of Scientific notation and units,
3. Demonstrate understanding of Stoichiometry,
4. Demonstrate understanding of Atomic structure & periodic table,
5. Demonstrate understanding of Chemical bonding,
6. Demonstrate understanding of Gases,
7. Demonstrate understanding of Ionic equilibrium,
8. Demonstrate understanding of Basic principles of organic chemistry
9. Demonstrate understanding of Basic principles of biochemistry.

***Topics to be Covered*:**
1. Significant figures,
2. Scientific notation and units,
3. Stoichiometry,
4, Atomic structure & periodic table,
5. Chemical bonding,
6. Gases,
7. Ionic equilibrium,
8. Basic principles of organic and biochemistry

FACULTY OF SCIENCES - DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
CHEM 281: General Chemistry Lab

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Chemistry Lab	CHEM 281	281 كم		3		1
Pre-requisites:	CHEM 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Safety rules, Chemical nomenclature, Acid radicals; Dil. HCl group Acid radicals; Conc. H_2SO_4group General group, General scheme for testing acid radicals + unknown, Basic radicals (1-6), General scheme for testing base radicals + unknown; Determination of the molecular weight of the volatile solution's vapor; Determination of percentage and number of molecules of water of crystallization; Titration using different indicators; 1- Determination of solubility product of sparingly soluble salt, 2- effect of common ion effect on the solubility

***Textbooks*:**
1. Chemical principles in the Laboratory with quantitative analysis, Slowiski. Wolsey. Masterton 6th ed., 1997 Brooks/Cole.

***Supplemental Materials*:**
1. Practical Experiments in Chemistry, Kim Gogarty, Col Harrison, Grahame Dobinson, 1st ed., Blake Education 2007.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate understanding ofbasic knowledge and principle in chemistry labs

***Topics to be Covered*:**
1. Safety rules,
2. Chemical nomenclature,
3. Acid radicals;
4, Dil. HCl group Acid radicals;
5. Conc. H_2SO_4group General group,
6. General scheme for testing acid radicals + unknown,
7. Basic radicals (1-6),
8. General scheme for testing base radicals + unknown;
   Determination of the molecular weight of the volatile solution's vapor;
9. Determination of percentage and number of molecules of water of crystallization;
10. Titration using different indicators;
11. Determination of solubility product of sparingly soluble salt,
12. Effect of common ion effect on the solubility

FACULTY OF ARTS AND HUMANITIES - DEPARTMENT OF COMMUNICATION SKILLS

COURSE SYLLABUS
COMM 101: Communication Skills

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Communication Skills	COMM 101	مهر 101	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
COMM 101 is structured as an introductory communication course. It is designed to expose students to the theories, skills, and strategies needed to become effective communicators in academic and professional settings. It explains the major theories of human communication and persuasion in interpersonal, small group, and public communication contexts. The course also focuses on effective communication skills and strategies for writing reports and CV's and for preparing and delivering effective presentations.

***Textbooks*:**
1. Saad B. Al-Masoodi (editor) (2006) Communication skills, Jeddah, King Abdulaziz University, Centre for Teaching & Learning Development. (In Arabic).

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Identify and describe the basic components of the communication model, the various types of communication, and the role communication plays to satisfy needs.
2. Describe the different skills and strategies that enhance communication effectiveness
3. Explain the major concepts used to describe interpersonal and small group processes
4. Observe and utilize the recommended strategies for developing and delivering and evaluating effective public presentations.

***Topics to be Covered*:**	***Duration in Weeks***
1. Introductory Week	1
2. Introduction to human communication	1
3. Intrapersonal communication	2
4. Verbal communication	1
5. Non-verbal communication	1
6. Listening skills	2
7. Human communication for better human relationships	1
8. Communication within small groups	1
9. Public Speaking	2
10. Writing up CV's, letters & reports/ personal interview prep tips	2

FACULTY OF COMPUTING & INFORMATION TECHNOLOGY - DEPARTMENT OF INFORMATION TECHNOLOGY
COURSE SYLLABUS
CPIT 100: Computer Skills

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Computer Skills	CPIT 100	100 تم	1	3		3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course aims to provide the students with advanced skills to operate and make use ofa personal computer in different environments such as in academia, in business, and at home. The course introduces the students to the main concepts and terminologies of information technology, and equipped them with the knowledge to administer one of widely-used operating systems. The course also aims to provide the students with the practical skills to utilize an office productivity package for different purposes. The course will prepare the students to new learning methodologies, namely distance learning and e-learning. The delivery of the course contents will be based on a hands-on approach.

***Textbooks*:**
1. "Computer Skills," Prepared by Computer Skills Unit, Fourth Edition.

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Explain all the basic concepts of information technology and its related terminologies.
2. Demonstrate advanced skills developed for the use of office productivity packages.
3. Search through the Internet effectively.
4. Fully utilize an e-mail service.
5. Demonstrate knowledge of e-learning and Distance Learning systems and how they work and their benefits

***Topics to be Covered*:**	***No. of Weeks***
1. Introduction to information Technology	1
2. Operating Systems (Microsoft Windows©)	1
3. Word Processing (Microsoft Word©)	3
4. Data Sheets (Microsoft Excel©)	2
5. Databases (Microsoft Access©)	3
2. Presentations (Microsoft Power Point©)	1
8. Internet (Microsoft IE©)	1
9. E-Mails (Microsoft Outlook©)	1
10 E-Learning and Distance Learning	1

ENGLISH LANGUAGE INSTITUTE
COURSE SYLLABUS
ELI 101: English Language I

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
English Language I	ELI 101	101 لغة		18		-
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
ELI 101 is a beginner course intended to provide students with a foundation from which they can advance from A1 Breakthrough to A2 Way stage on the Common European Framework of Reference for Languages (CEFR). It is a seven-week module course with 18 hours of instruction each week.

***Textbooks*:**
1. *Soars, John and Liz, (2011), New Headway Plus Beginner Student's Book, Special Edition, Oxford University Press*

Supplemental Materials:
1. Workbook with DVD-ROM.
2. Learning Management System (LMS) for online practice at www.headwayplusonline.com accessed with the Student's Access Code found in the back of the Student's Book.
3. Headway Plus Beginner Writing Guide for additional writing support.

Course Learning Outcomes:
By the completion of the course the student should be able to:
1. Read and understand basic expressions and short, simple texts.
2. Engage in simple oral communications in order to provide and obtain essential information, using appropriate pronunciation.
3. Write basic, simple sentences leading to a paragraph.
4. Demonstrate limited control of essential grammatical structures.

Course Length and Pacing
ELI 101 consists of 18 hours of class time each week. The English Language Institute follows a modular system with two modules taught in each academic semester. Thus, the course length for ELI 101 is one module of seven calendar weeks which allows for a total of 126 hours of class time each module. The 101 Instructor's Pacing Guide is designed on a weekly basis, specifying available materials and providing instructors with a degree of flexibility, allowing ample class time for language practice, and for the incorporation of relevant supplementary materials to facilitate SLO achievement. It also emphasizes regular Learner Training as an essential component of the learning process.

ENGLISH LANGUAGE INSTITUTE
COURSE SYLLABUS
ELI 102: English Language II

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
English Language II	ELI 102	لغة 102		18		2
Pre-requisites:	Successful completion of ELI 101 or an Oxford Online Placement Test score corresponding to high beginner proficiency level					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: ELI 102 is an elementary level course aiming to build and further develop language proficiency at A2 Waystage level on the Common European Framework of Reference for Languages (CEFR), moving towards a higher level of proficiency at this stage. It is a seven-week module course with 18 hours of instruction each week.						

***Textbooks*:**
1. *Soars, John and Liz, (2011), New Headway Plus Beginner Student's Book, Special Edition, Oxford University Press*

***Supplemental Materials*:**
1. Workbook with DVD-ROM.
2. Learning Management System (LMS) for online practice at www.headwayplusonline.com accessed with the Student's Access Code found in the back of the Student's Book.
3. Headway Plus Elementary Writing Guide for additional writing support.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Read and understand simple texts and a range of high frequency vocabulary in context.
2. Talk about aspects of personal and everyday life, using appropriate stress, intonation, and rhythm of speech, and understand simple, spoken texts on familiar topics.
3. Write simple cohesive paragraphs on familiar topics.
4. Demonstrate some control of essential grammatical structures with occasional inconsistencies.

Course Length and Pacing
ELI 102 consists of 18 hours of class time each week. The English Language Institute follows a modular system with two modules taught in each academic semester. Thus, the course length for ELI 102 is one module of seven calendar weeks which allows for a total of 126 hours of class time each module. The 102 Instructor's Pacing Guide is designed on a weekly basis, specifying available materials and providing instructors with a degree of flexibility, allowing ample class time for language practice, and for the incorporation of relevant supplementary materials to facilitate SLO achievement. It also emphasizes regular Learner Training as an essential component of the learning process.

ENGLISH LANGUAGE INSTITUTE
COURSE SYLLABUS
ELI 103: English Language II

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
English Language III	ELI 103	لغة 103		18		2
Pre-requisites:	Successful completion of ELI 102 or an Oxford OnlinePlacement Test score corresponding to elementary proficiency level.					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: ELI 103 is a pre-intermediate level course aiming to build and further improve language proficiency at A2 Waystage level on the Common European Framework of Reference for Languages (CEFR), moving into the B1 Threshold on the CEFR. It is a seven-week module course with 18 hours of instruction each week.						

***Textbooks*:**

1. *Soars, John and Liz, (2011), New Headway Plus Beginner Student's Book, Special Edition, Oxford University Press*

***Supplemental Materials*:**

1. Workbook with DVD-ROM.
2. Learning Management System (LMS) for online practice at www.headwayplusonline.com accessed with the Student's Access Code found in the back of the Student's Book.
3. Headway Plus Pre-Intermediate Writing Guide for additional writing support

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Read and understand the main ideas of a variety of texts.
2. Participate effectively in a short conversation using appropriate and understand the main ideas in short oral communications
3. Produce a range of text types using coherent and cohesive paragraphs in an adequately developed response.
4. Demonstrate control of a range of grammatical structures with minor inconsistencies.

Course Length and Pacing

ELI 103 consists of 18 hours of class time each week. The English Language Institute follows a modular system with two modules taught in each academic semester. Thus, the course length for ELI 103 is one module of seven calendar weeks which allows for a total of 126 hours of class time each module. The 103 Instructor's Pacing Guide is designed on a weekly basis, specifying available materials and providing instructors with a degree of flexibility, allowing ample class time for language practice, and for the incorporation of relevant supplementarymaterials to facilitate SLO achievement. It also emphasizes regular Learner Training as an essential component of the learning process.

ENGLISH LANGUAGE INSTITUTE
COURSE SYLLABUS
ELI 104: English Language IV

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
English Language IV	ELI 104	104 لغة		18		2
Pre-requisites:	Successful completion of ELI 103 or an Oxford Online Placement Test score corresponding to pre-intermediate proficiency level.					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: ELI 104 is an intermediate level course aiming to build andfurther improve language proficiency at B1 Threshold level on the CommonEuropean Framework of Reference for Languages (CEFR). It is a seven-week modulecourse with 18 hours of instruction each week.						

***Textbooks*:**

1. *Soars, John and Liz, (2011), New Headway Plus Beginner Student's Book, Special Edition, Oxford University Press*

***Supplemental Materials*:**

1. Workbook with DVD-ROM.
2. Learning Management System (LMS) for online practice at www.headwayplusonline.com accessed with the Student's Access Code found in the back of the Student's Book.
3. Headway Plus Intermediate Writing Guide for additional writing support

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Read and understand a wide variety of extended texts.
2. Listen to, understand, and participate in extended oral communications.
3. Construct a range of coherent and cohesive texts with multiple paragraphs in afully developed response.
4. Demonstrate consistent control of a wide range of grammatical structures.

Course Length and Pacing

ELI 104 consists of 18 hours of class time each week.The English Language Institute follows a modular system with two modules taught ineach academic semester. Thus, the course length for ELI 104 is one module of sevencalendar weeks which allows for a total of 126 hours of class time each module. The104 Instructor's Pacing Guide is designed on a weekly basis, specifying availablematerials and providing instructors with a degree of flexibility, allowing ample classtime for language practice, and for the incorporation of relevant supplementarymaterials to facilitate SLO achievement. It also emphasizes regular Learner Trainingas an essential component of the learning process.

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ISLAMIC STUDIES
COURSE SYLLABUS
ISLS 101: Islamic Culture (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Islamic Culture (1)	ISLS 101	سلم 101	2			2
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course aims to familiarize students with the fundamental aspects and the basic conceptsof Islamic culture. It further discusses the basic tenets of Islam as well as the issuesand principles related to faith and their impact on both individuals and society. The coursealso looks at the position of Islamic culture versus other cultures and civilizations.

***Textbooks*:**
1. Dr. Ali O. Badahdah & Dr. Mohammad A. Ba-Jaber (2008) Islamic Culture (level 1), King Abdulaziz University, Centre for Scientific Publications. (In Arabic)

***Supplemental Materials*:**
1. Hindi Saleh & Al-Hawari Mohammad (2000): Islamic Culture, Amman, Dar Al-Fikr. (In Arabic).
2. Al-Khatib Omar (1975): Glimpses of Islamic Culture, Beirut, Dar Al-Kitab Al-Lubnani. (In Arabic)
3. Jamal A. Mohammad (1977): Lectures on Islamic Culture, Jeddah. King Abdulaziz University, Fifth Ed. (In Arabic)
4. Al-Sayyid A. Taha (1996): Islamic Culture, Amman, Dar Al-Manahij. (In Arabic)

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate understanding of the idiomatic of culture and know the conception of Islamic culture and its specification, its importance, and its relation with others cultures.
2. Demonstrate understanding of the idiomatic of Islamic faith, its specification and impact on the individual and society, and learn a group of important matter in the life.
3. Demonstrate understanding of the meaning of worship in Islam, its specifications, its provision and its motive, its aims, with understanding of wrong conception and practice in Islam.
4. Demonstrate ability to deal with others civilizations, form the basis of his own civilization distinguish, with getting a benefit from the others cultures.
5. Demonstrate ability to fulfill the practice impact of faith on himself, and in his society practical life.
6. Demonstrate ability to distinguish between the right conceptions of the basic affaire of faith, and its correct application and wrong conception and its implications
7. Demonstrate ability to achieve the aims of worship, and avoid the wrong conception.

Topics to be Covered:		***No. of Weeks***
1.	The concept & origin of Islamic culture	1
2.	The importance of Islamic culture & its relationship to other cultures	1
3.	The concept & foundations of Islamic faith	1
4.	The characteristics of Islamic faith	1
5.	The effects of faith on individuals & society	1
6.	Issues in faith: relationship between faith & Shari'a Law, freedom of belief in Islam	1
7.	Issues in faith: Major sins & faith, implementing Shari'a Law, mocking religion, loyalty and disavowal	1
8.	Issues in faith: extremism in Islam, reason & revelation	1
9.	The concept of worship	1
10.	Motives & conditions of worship	1
11.	Provisions, characteristics & purpose of worship	2
12.	Wrong concepts & practices of worship	2

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ISLAMIC STUDIES
COURSE SYLLABUS
ISLS 201: Islamic Culture (2)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Islamic Culture (2)	ISLS 201	201 سلم	2			2
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course aims to: identify the Islamic legislation to the student with its general aims, and identifying with Holy Quran and its specifications, and the position of its coming, and its proof, and take the Muslims attention to its rights, and fixed the prophet Muhammad (peace be upon him)

***Textbooks*:**
1. Dr. Faisal Bin Saeed Baalamash, Husham Bin Saeed Azhar, and DrFathiya Abdulsamad Obaid,Islamic Culture (Second Level), King Abdulaziz University, Centre for Scientific Publications. (In Arabic)

***Supplemental Materials*:**
1.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate understanding ofIslamic legislation, its aims and characteristics.
2. Demonstrate understanding of Quran, its importance, global aims and the Muslims' duties towards Quran.
3. Demonstrate understanding of Sunnah, its importance, global aims and the Muslims' duties towards Sunnah.
4. Demonstrate understanding of the roles of Ijmaa, Quias, Ijtihad, and Fatwa.

***Topics to be Covered*:**		***No. of Weeks***
1	Islamic legislation and its characteristics	2
2.	Aims of Islamic legislation (Sharia)	2
3.	Introduction to Quran Studies	3
4.	Introduction to Sunnah (words, actions and silent assertions of Prophet Muhammad PBUH)	3
5.	Consensus (Ijmaa)	1
6.	Analogical reason (Quias)	1
7.	Reasoning (Ijtihad) and learned interpretation and opinion (Fatwa)	2

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ISLAMIC STUDIES
COURSE SYLLABUS
ISLS 301: Islamic Culture (3)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Islamic Culture (3)	ISLS 301	301 سلم	2			2
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course aims to: identify the Islamic systems to the students, with its general specifications and its principals and concentrate in the special way on the family system, and social system in Islam, with connect between theoretical provision and the actual practical with its all different problems and affairs, and identify the famous modern affairs, and show the ways hoe to deal with this affairs, in the Islamic form.

***Textbooks*:**
1. Dr. Faisal Bin Saeed Ba alamashHusham Bin Saeed Azhar, and DrFathiya Abdulsamad Obaid,Islamic Culture (Third Level), King Abdulaziz University, Centre for Scientific Publications. (In Arabic)

Supplemental Materials:
1.

Course Learning Outcomes:
By the completion of the course the student should be able to:
1. Demonstrate understanding of the idiomatic of culture, and know the conception of Islamic culture and its specification, its important, and its relation with others cultures.
2. Demonstrate understanding of idiomatic of Islamic faith, its specification and impact on the individual and society, and learn a group of important matter in the life.
3. Demonstrate understanding of the meaning of worship in Islam, its specifications, its provision, and its motive, its aims, with understand for wrong conception and practice in Islam.
4. Demonstrate ability to deal with others civilizations, form the basis of his/her own civilization's distinctions.

Topics to be Covered:	***No. of Weeks***
1. **I^s' section: Family system in Islam :**	
• Concept and provision of marriage	1
• Family important modern affaires	2
2. 2 "d**Section :Social system in Islam**	
• Conception of Islamic society.	1
• Specification of Islamic society and the Islamic society establishment.	1

- Impact of Islamic legislation and strength the social relation: worship (collective pray, zakah ,charity and pray of two Eids,(prevent the sales of brothers on his brother sales, prevent to meet the riders , prevent form monopoly, family jursdepndance , prevent form engagement on your brother engagement, 2
- Details of Some religious provision relations: 1
- The important social problems: its reasons andhow to solve it. 1

3. **3rd Section: Islamic Affairs and Modern affairs**
   - Dialogue between Civilizations. 1
   - Human rights in Islam. 1
   - Globalization and its varied type. 1
   - Calling for favor and prevent form Abominable 1
   - Islamic attitude from the terrorism. 1

FACULTY OF ARTS & HUMANITIES - DEPARTMENT OF ISLAMIC STUDIES
COURSE SYLLABUS
ISLS 401: Islamic Culture (4)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Islamic Culture (4)	ISLS 401	سلم 401	2			2
Pre-requisites:	ISLS 201					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course aims to: identify the Islamic concept of morality, And its importance in life, and to clarify the significance of ethics in the modern era, and to highlight the assets and Islamic landmarks of Sciences linguistic, psychological, social and media, and a statement contributions Muslims practical and scientific therein, including strengthens affiliation Muslim youth to his nation and his pride religion and civilization, and to clarify the jurisprudence and Islamic Studies required in the above areas.

***Textbooks*:**
1. Islamic culture (level IV) (under preparation and authoring)with participation of the Faculty of Arts and Humanities and professors of Islamic Studies).

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate understanding of the meaning of the language of morality and idiomatically, and the place of morality in Islam and the contemporary ethics.
2. Demonstrate understanding of the Islamic assets of linguistic and psychological sciences, social, media, and the contributions of Muslims.
3. Demonstrate understanding of contemporary jurisprudence for technical and medical professions.
4. Demonstrate the ability to embryogenesis Islamic ethics of professions linguistic psychological, social and media.

***Topics to be Covered*:**		***No. of Weeks***
1	The concept of ethics of the profession	1
2.	Great prestige of morality inIslam	1
3.	Professional ethics in the modern era	2
4.	Models of professional ethics in the light of Quran and Sunnah	2
5.	Models applied to ethics of Islamic civilization.	2
6.	Islamic assets of linguistic and psychological sciences, social, media, and the contributions of Muslims.	2
7.	Contemporary jurisprudence of occupations associated with humanities and media.	2
8.	Ethics related professions of humanities and media.	2

ACULTY OF SCIENCES - DEPARTMENT OF MATHEMATICS
COURSE SYLLABUS
MATH 110: General Mathematics (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Mathematics (1)	MATH 110	110 ر	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: This course is a first Calculus dealing mainly with differential calculus. After a discussion of few mathematical preliminaries, we introduce functions and models, limits and derivatives, differentiation rules, and finally applications of differentiation.						

***Textbooks*:**
1. J. Stewart, Calculus, Early Transcendentals, Seventh Edition. International Metric Version, 2012.

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Handle functions occurring in calculus and in the mathematical modeling of real-world problems;
2. Grasp the central idea of limit and continuity, and its application in a variety of problems;
3. Understand the main theme of calculus and its applications involving rates of change and the approximation of functions;
4. Differentiate standard functions by applying the fundamental rules of differentiation;
5. Compute the optimal values of functions and handle the optimization problems;
6. Apply the concepts of monotonicity and concavity in sketching the plane curves;
7. Deal with indeterminate forms and L'Hôpital's rule;
8. Understand the connection between derivatives and antiderivatives.
9. Handle functions occurring in calculus and in the mathematical modeling of real-world problems;

***Topics to be Covered*:**
1. Mathematical Preliminaries
    a. Numbers, Inequalities, and Absolute Values
    b. Coordinate Geometry and Lines
    c. Graphs of Second-Degree Equations
    d. Trigonometry
2. Functions and Models
    a. Four Ways to represent a Function
    b. Mathematical Models
    c. New Functions from Old Functions

d. Graphing Calculators and Computers
e. Exponential Functions
f. Inverse Functions and Logarithms

3. Limits and Derivatives
    a. The Tangent and Velocity Problems
    b. The Limit of a Function
    c. Calculating Limits Using the Limit Laws
    d. Continuity
    e. Limits at Infinity; Horizontal Asymptotes
    f. Derivatives and Rates of Change
    g. The Derivative as a Function
4. Differentiation Rules
    a. Derivatives of Polynomials and Exponential Functions
    b. The Product and Quotient Rules
    c. Derivatives of Trigonometric Functions
    d. The Chain Rule
    e. Implicit Differentiation
    f. Derivatives of Logarithmic Functions
    g. Rates of Change in the Sciences
    h. Exponential Approximations and Differentials
    i. Hyperbolic Functions

5. Applications of Differentiation
    a. Maximum and Minimum Values
    b. The Mean Value Theorem
    c. How derivatives Affect the Shape of a Graph
    d. Intermediate Forms and L'Hospital Rule
    e. Summary of Curve Sketching
    f. Graphing with Calculus and Calculators
    g. Optimization Problems
    h. Antiderivatives

FACULTY OF SCIENCES - DEPARTMENT OF MATHEMATICS
COURSE SYLLABUS
MATH 202: Calculus II

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Calculus II	MATH 202	202 ر	3			3
Pre-requisites:	MATH 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: This course deals mainly with Integral Calculus. We cover Integrals, Applications of Integration, Techniques of Integration, and further applications of Integration to the Sciences and Engineering.						

***Textbooks*:**

1. J. Stewart, Calculus, Early Transcendentals, Seventh Edition. International Metric Version, 2012.

***Supplemental Materials*:**

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Comprehend the connection between differential and integral calculus, and use of integrals to find the area bounded by curves.
2. Calculate the volume of solids, lengths of plane curves, work done by a varying force, etc. by means a definite integral;
3. Use exponential and logarithmic functions to describe exponential growth and decay in problems of applied nature;
4. Evaluate the integrals using different techniques and integral formulae;
5. Distinguish between proper and improper integrals;
6. Perform numerical integration.

***Topics to be Covered*:**

1. Integration
    a. Sigma Notation
    b. Areas and Distances
    c. The Definite Integral
    d. The Fundamental Theorem of Calculus
    e. Indefinite Integrals and the Net Change Theorem
    f. The Substitution Rule
2. Applications of Integration
    a. Areas between Curves
    b. Volumes
    c. Volumes by Cylindrical Shells
    d. Work
    e. Average Value of a Function

3. Techniques of Integration
    a. Integration by Parts
    b. Trigonometric Integrals
    c. Trigonometric Substitution
    d. Integration of Rational Functions by Partial Fractions
    e. Strategy for Integration
    f. Approximate Integration
    g. Improper Integrals

4 Further Applications of Integration
    a. Arc Length
    b. Area of a Surface of Revolution
    c. Applications to Physics and Engineering
    d. Applications to Economics and Biology
    e. Probability

FACULTY OF SCIENCES - DEPARTMENT OF MATHEMATICS
COURSE SYLLABUS
MATH 203: Calculus III

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Calculus III	MATH 203	203 ر	3			3
Pre-requisites:	MATH 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: This course deals with Calculus topics that are not treated inMath 110 and Math 202. We will study in details Parametric Equations and Polar Coordinates, Vectors and the Geometry of Space, Vector Functions, and Partial derivatives.						

***Textbooks*:**

1. J. Stewart, Calculus, Early Transcendentals, Seventh Edition. International Metric Version, 2012.

***Supplemental Materials*:**

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Know about the basics of parameterization of plane curves, polar coordinates, and conic section;
2. Use vectors in two and three dimensions to describe lines and planes in space;
3. Understand sketching of quadric surfaces;
4. Comprehend vector-valued functions and their use to describe the motion of objects through space;
5. Grasp the idea of the epsilon-delta definition of the limit, and understand the methods for proving existence and non-existence of limit of functions of two/three variables;
6. Learn the idea of partial derivative and application of the chain rule; solve optimization problems without and with constraints.

***Topics to be Covered*:**

1. Parametric Equations and Polar Coordinates
    a. Curves Defined by Parametric Equation
    b. Calculus with Parametric Curves
    c. Polar Coordinates
    d. Areas and Lengths in Polar Coordinates
    e. Conic Sections
    f. Conic Sections in Polar Coordinates
2. Vectors and the Geometry of Space
    a. Three-Dimensional Coordinate Systems
    b. Vectors
    c. The Dot Product
    d. The Cross Product
    e. Equations of Lines and Planes

f. Cylinders and Quadric Surfaces

3. Vector Functions
    a. Vector Functions and Space Curves
    b. Derivatives and Integrals of Vector Functions
    c. Arc Length and Vector Functions
    d. Motion in Space: Velocity and Acceleration
4. Partial Derivatives
    a. Functions of Several Variables
    b. Limits and Continuity
    c. Partial Derivatives
    d. Tangent Planes and Linear Approximations
    e. The Chain Rule
    f. Directional Derivatives and the Gradient Vector
    g. Maximum and Minimum Values
    h. Lagrange Multipliers

FACULTY OF SCIENCES - DEPARTMENT OF MATHEMATICS
COURSE SYLLABUS
MATH 204: Differential Equations I

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Differential Equations I	MATH 204	204 ر	3	1		3
Pre-requisites:	MATH 202					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Basic concepts - First-order differential equations - Existences and Uniqueness for initial – boundary value problems - Separable variables - Homogeneous equations - Exact equations. Linear equations - Equations of Bernoulli - Ricatti. Substitutions - Picard's methods - Linear differential equations of higher-order - Homogeneous equations with constant coefficients, Method of undetermined coefficients, Method of variation of parameters. Differential equations with variable coefficients, Cauchy-Euler equations - Laplace Transform - Applications of Laplace transform to solve ordinary differential equations.

***Textbooks*:**
1. C. H. Edwards & D. E. Penney, Elementary Differential Equations with Boundary Value Problems, Sixth Edition. Pearson Prentice Hill, 2008.

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Deriving ODEs that describe various phenomena in physics, mechanics, chemistry, biology, etc.
2. Learning various methods for solving a great variety of differential equations.
3. Upgrading the skills of the student to understand more better the other branches physics, mechanics, chemistry, biology.

***Topics to be Covered*:**
1. Basic concepts:
    a. Definitions.
    b. Classifications of ODEs.
    c. Solutions types.
    d. Origin of ODEs.
2. First-order differential equations.
    a. Preliminary theory.
    b. Existences and uniqueness for initial – boundary value problems.
    c. Separable variables,
    d. Homogeneous equations.
    e. Exact equations.
    a. Linear equations.
    f. Equations of Bernoulli,

g. Ricatti. Substitutions.
h. Picard's methods.

3. Linear differential equations of higher-order:
    a. Preliminary theory
    b. Existences and uniqueness for initial – boundary value problems.
    c. Basic concepts;
    a. Linear dependence and Linear independence,
    d. Superposition principle for homogeneous equations,
    e. fundamental set,
    f. Superposition principle for non-homogeneous equations,
    g. Constructing of a second solution from a known solution,
    h. Homogeneous equations with constant coefficients,
    i. Method of undetermined coefficients,
    j. Method of variation of parameters.
    k. Differential equations with variable coefficients,
    l. Cauchy-Euler equations.
4. Laplace Transform:
    a. Laplace transform,
    b. Inverse transform,
    c. Translation theorems,
    d. differentiation and Integration of the Laplace Transform,
    e. Partial Fractions,
    f. Transform of derivatives,
    g. Convolution,
    h. Transform of periodic functions,
    i. Applications of Laplace transform to solve ordinary differential equations.

FACULTY OF SCIENCES - DEPARTMENT OF MATHEMATICS
COURSE SYLLABUS
MATH 205: Series and Vector Analysis

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Series and Vector Analysis	MATH 205	205 ر	3			3
Pre-requisites:	MATH 202 and MATH 203					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: This course deals mainly with Integral Calculus. We cover Integrals, Applications of Integration, Techniques of Integration, and further applications of Integration to the Sciences and Engineering.						

***Textbooks*:**

1. J. Stewart, Calculus, Early Transcendentals, Seventh Edition. International Metric Version, 2012.

***Supplemental Materials*:**

***Course Learning Outcomes*:**

By the completion of the course the student should be able to:

1. Grasp the concepts of infinite sequences and series, idea of convergence and divergence of the infinite series, representation of functions as power series, Taylor series, Maclaurin series and Fourier series.
2. Evaluate double and triple integrals, and learn their use to compute volume, surface area, entroids, etc., and change of variables in multiple integrals
3. Understand calculus of vector fields, line integrals and surface integrals with applications, connection between line integral, double integral, and triple integral (Green's Theorem, Stokes' Theorem, The Divergence Theorem).

***Topics to be Covered*:**

1. Infinite Sequences and Series
    a. Sequences
    b. Series
    c. The Integral Test and Estimates of Sums
    d. The Comparison Tests
    e. Alternating Series
    f. Absolute Convergence and the Ratio and Root Tests
    g. Strategy for Testing Series
    h. Power Series
    i. Representations of Functions as Power Series
    j. Taylor and Maclaurin Series
    k. Applications of Taylor Polynomials
2. Multiple Integrals
    a. Double Integrals over Rectangles
    b. Iterated Integrals

c. Double Integrals over General Regions
d. Double Integrals in Polar Coordinates
e. Applications of Double Integrals
f. Triple Integrals
g. Triple Integrals in Cylindrical Coordinates
h. Triple Integrals in Spherical Coordinates
i. Change of Variables in Multiple Integrals

3. Vector Calculus
    a. Vector Fields
    b. Line Integrals
    c. The Fundamental Theorem for Line Integrals
    d. Green's Theorem
    e. Curl and Divergence
    f. Parametric Surfaces and Their Areas
    g. Surface Integrals

FACULTY OF SCIENCES - DEPARTMENT OF PHYSICS
COURSE SYLLABUS
PHYS 110: General Physics (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Physics (1)	PHYS 110	110 فيز	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Physical quantities and dimensional analysis, vectors, motion in one dimension, motion in a plane, Newton's laws, friction, work and energy, impulse, momentum, collisions, and rotational motion.						

***Textbooks*:**
1. C. H. Edwards & D. E. Penney, Elementary Differential Equations with Boundary Value Problems, Sixth Edition. Pearson Prentice Hill, 2008.

***Supplemental Materials*:**
1. Physics for scientist and engineers with modern physics by Serway (2005), Saunders College Publisher.
2. University Physics by Sears, Zemansky, and Young (2007).
3. Physics by Halliday, Resnick & Krane (2008) John Wiley & Sons.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Describe understanding of the fundamental concepts of mechanics.

***Topics to be Covered*:**
1. Physical quantities and dimensional analysis,
2. Vectors,
3. Motion in one dimension,
4, Motion in a plane,
5. Newton's laws,
6. Friction,
7. Work and energy,
8. Impulse,
9. Momentum,
10. Collisions,
11. Rotational motion.

FACULTY OF SCIENCES - DEPARTMENT OF PHYSICS
COURSE SYLLABUS
PHYS 202: General Physics (2)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Physics II	PHYS 202	202 فيز	3	2		4
Pre-requisites:	PHYS 110, MATH 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Charge and electric force, electric field, Gauss' law, electric potential, capacitance, current and resistance, DC circuits, magnetic force, magnetic field, induction and inductance, magnetism of matter and Maxwell's equations.						

***Textbooks*:**
1. Halliday, Resnick & Walker, Fundamental of Physics, John Wiley & Sons, 2008.

***Supplemental Materials*:**
1. Physics for scientist and engineers with modern physics by Serway (2005), Saunders College Publisher.
2. University Physics by Sears, Zemansky, and Young (2007).
3. Physics by Halliday, Resnick & Krane (2008) John Wiley & Sons.

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Understand more concepts of physics by studying electricity and magnetism

***Topics to be Covered*:**
1. Charge and electric force
2. Electric field,
3. Gauss' law,
4, Electric potential,
5. Capacitance,
6. Current and resistance,
7. DC circuits,
8. Magnetic force,
9. Magnetic field,
10. Induction and inductance,
11. Magnetism of matter and Maxwell's equations.

FACULTY OF SCIENCES - DEPARTMENT OF PHYSICS
COURSE SYLLABUS
PHYS 281: General Physics Lab.

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Physics Lab.	PHYS 281	281 فيز		2		1
Pre-requisites:	PHYS 110					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Safety & regulations- friction- free fall- force table- Newton‘s law- projectile motion- air track- rotational motion- simple pendulum- hook’s law						

***Textbooks*:**
1. Halliday, Resnick & Walker, Fundamental of Physics, John Wiley & Sons, 2008.

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Carry out experiments in Mechanics

***Topics to be Covered*:**
1. Safety & regulations-
2. friction
3. free fall
4, force table
5. Newton‘s law
6. projectile motion
7. air track
8. rotational motion
9. simple pendulum
10. hook’s law

FACULTY OF SCIENCES - DEPARTMENT OF STATISTICS
COURSE SYLLABUS
STAT 110: General Statistics (1)

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
General Statistics (1)	STAT 110	281 ص	3			3
Pre-requisites:	None					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
This course is designed to teach students how to use a broad base of statistical methodsand concepts to organize, analyze, and interpret hypotheses developed in various applications.This course consists of three main parts: (1) Data analysis and description,
(2) Probability and random variables, and (3) Inferential statistics. Main goal for this class is to familiarize students with the various techniques of statisticalanalyses that are utilized in different disciplines. Emphasis will be on the basic concepts andtheir meaning, as well as their applications and interpretation

***Textbooks*:**
1. Elementary Statistics a Step by Step Approach, 7th Edition by Allan Bluman, McGraw/Hill,2006.

***Supplemental Materials*:**
1. Larson & Farber, "Elementary Statistics: Picturing the World", 3rd Edition (2006)

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:
1. Demonstrate an understanding of statistics.
2. Learn some commonly used statistical techniques.
3. Apply these techniques in describing and analyzing data.
4. Use statistics to solve different kind of problems.
5. Recognize sound/good statistical studies.
6. Gain an appreciation for analytical skills.

***Topics to be Covered*:**
1. Collecting data, graphical presentation and tabulation.
2. Measures of central tendency: Mean, Median and Mode.
3. Measures of dispersion: range, and standard deviation.
4, Relative Dispersion and Skewness.
5. Elementary probability: random experiment, sample space, event, and computation of probability. Rules of addition and multiplication, conditional probability and independence.
6. Random variables, probability distributions, variance and expected value - Some probability distributions (Binomial, Poisson, and Normal).
7. Sampling and sampling distribution: Sampling distribution of Sample Mean (in case of large samples), central limit theorem and sampling distribution of proportion.
8. Estimation of population mean and proportion.

Tests of statistical hypotheses: testing of mean, differences between two means, proportion, differences between two proportions in large samples.

9. Simple linear regression and Correlation: Pearson's correlation coefficient and Spearman's rank correlation coefficient.
10. Collecting data, graphical presentation and tabulation.