



Course Descriptions

Department: Biomedical Engineering
Program: Bachelor of Biomedical Engineering

First Year Courses

BUST02 English Language (1) (8P) 4 credits

The current course provides students with the language basics of everyday English to help them communicate in different real life situations. The course focuses more on real life conversations and the basic grammars that will help each one in his/her major.

Moreover, the course provides students with plenty of writing and speaking practices. The updates of the book allow students to be posted with the latest language uses and functions that are easy and useable in real life situations.

BBM052 Chemistry (2L,2T) 3 credits

A one-semester course designed to meet the general chemistry requirement for engineering students. Topics include stoichiometry; thermodynamics; gases, liquids, and solids; equilibrium; acids and bases; bonding concepts; kinetics; reactions; and materials science. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. The chemistry course is designed to provide the novice Engineer with a fundamental understanding of current concepts of life chemistry. The course is revised each year to update and improve its content. Hopefully the progression of topics will develop the subject in a fashion useful to the student, especially if he/she feels insecure about chemical and matter concepts.

BENG02 Engineering Drawing (3L) 3 credits

The general aim of this course is to provide students with theoretical and practical background in Engineering Drawing. This Course focuses on principles, terminologies, tools of Engineering Drawing to enhance the positive ability of students in being more precise in Drawing and measurements. Teaching strategies this course are lectures and activation the hand skill of student through practical assignment in class as well as home works. Assessment tasks are homework assignment and exams. This course does not have any pre-requests.

BENG01 Mathematics (2L, 2T) 3 credits

Course discusses the principles of Linear Equations and Applications, Linear Inequalities, Absolute Value in Equations and Inequalities, Quadratic Equations and Applications, Laws of Power and Logarithm, Power and Logarithm Equations, Functions, type of Functions, limited and continuity.

L=Lecture, **T**=Tutorial, **P**=Practical

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BUST06 English Language (2)

(8P) 4 credits

The current course provides students with the language basics of everyday English to help them communicate in different real life situations. The course focuses more on real life conversations and the basic grammars that will help each one in his major.

Moreover, the course provides students with plenty of writing and speaking practices. The updates of the book allow students to be posted with the latest language uses and functions that are easy and useable in real life situations.

BBM041 Electrical Circuit Analysis I

(2L, 2T) 3 credits

This course provides the students with basics concept and properties of electrical circuits and networks, also a strategy to have the techniques to analyze and design electrical circuits. This course contains the fundamentals of common electrical circuits, Resistive Network Analysis, inductors and Capacitors Circuits, Introduction to alternating current (AC) and Transient Analysis of RLC circuits. The teaching strategies include: lecture, tutorial, practical, simulations, and projects. It is one of college requirement courses.

BENG04 Calculus

(2L, 2T) 3 credits

Course discusses the principle of limited and show the theories of limited and continue, how to procedure differentiation and its special rules with the study of implicit functions differential , defined the integration and the link between the processes of differentiation and integration, integration rules, methods of integration and its practical applications. The prerequisite is BENG01.

BENG03 Physics

(2L, 2T, 2P) 4 credits

The importance of this course is to provide students with physical background of the variable ways to solve real problems. This Course includes physical quantities, vectors, Newton's Laws of Motion, physical prosperities of materials, Waves and sounds, Electricity, Magnetism, Light and Optics. The course carried out using the lectures and self-learning and discussion, Miniature education, Solve problems, experiments used to teach this course, We will use strategies assessment Quizzes, Written Examinations, oral examinations, notes, and micro-reports and there are no prerequisite.

BUST09 Computer Skills

(6 P) 3 credits

This course provides a student by basic skills for using computer at studying environment, library, and at home. It presents the knowledge of basic computer and information technology concepts. The course provides the knowledge needed to operate and utilize the operating system and office software package, and to use the computer for Internet access and electronic communication.

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BBM061 Biology

(2L) 2 credits

This course started with some terms related to biology ,also it provides a brief view difference between living and non-living organism, life on earth, introduces the characteristics and diversity of organisms and provides a comprehensive foundation in cell structure and function, energy transformations (photosynthesis and respiration), and the cell division such as mitosis and meiosis.

BBM062 Biology (Lab)

(2P) 1 credit

This course provides a continuation of the biological lab study of the animal body. The topics include the macromolecules, cell organelles the cells of RBS, WBC, plasma, blood and cell count, blood groups cell division, cell transport and enzymes.

Upon completion, student should be able to demonstrate an in depth understanding of principles of biological lab and their inter-relationships. The laboratory work will include dissection of rabbits, pigeons and frogs. There will be a Co-requisite course of biology needed.

BUST5 Islamic Culture

(4L) 4 credits

The Islamic Culture is one of the most important study courses for its role in Islamic character formation which able to read its past, understanding its reality and contributing in building the future, positively and according to, Sharia of God (Allah) and meeting the needs of life not excessively.

This course is applied by dialogue and discussion, as well as the students are asked to do searches that serve it. The student's levels have evaluated by class and non-class contributing, the duties have given to them, and the semester and final exams.

BUST07 Skills of Holy Quran Recitation& Tajweed:

(2P) 1 credit

This course is one of the most important courses for its relation to the Words of Allah The Al-Mighty and it is one of the universities requirements. Also, It is theoretical and applied course that the student does recitation and memorizing half a part of Ama, Suraht (Al- Tariq and Al-Na'as) Studying the attributes which should be applied in the Quran's reader and understanding and applying these rules during the reading of Holy Quran. Both dialogue and discussion in the teaching and the student has evaluated by his Quran recitation during the learning meetings beside doing the duties in the semester, in addition to the mid-term and final exams.

BUST07 Communication Skills

(1L) 1 credit

The Communication Skills aim to student's knowing with the theories and basic concepts in the field of the Human Communication and developing the basic skills in the field of Good Communication with the self and others and enhancing his daily practices by using serious techniques that depending on active.

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BUST08 Critical Thinking

(1 L) 1 credit

The Critical Thinking is a subject its main aim is building and developing the mental skill of the students in the field of dealing with read and audio opinions and ideas based on the organized mental skills, knowledge skills and experiences. It is included a number of main themes such as, the Critical Thinking, its applied and educational benefit, its standards, obstacles and its basic assisting components and how to build convinced arguments based on the critical deduction.

The course is included with applying the thinking skills on some phenomena and the vital fields of life. The typical methods of teaching it is limited in lectures, interventions and long discussions with enhancing that with a great deal training techniques such as, playing some roles, viewing videos and carrying out some debates. It has allocated 14 hours to teach and train its concepts in each class and it is taught with an hour system (Lecture time is one hour) .

BUST03 Arabic Language

(2L, 4P) 4 credits

The course is concerned of developing the basic linguistic skills for the student as one of the universities requirements which explains a number of communicating activities and linguistic, dictating and composing lessons and it is consisted of two books:

The first focuses on listening and spoken skills and the second on reading and writing that both of them contain grammatical bases and some dictation rules.

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Second Year Courses

BBM044 Medical Electronics I

(2L, 2T) 3 credits

This course introduces students to the fundamental principles and concepts of electronic devices and their applications that are required in the design and implementation of biomedical instrumentation. The course covers the concept of semiconductor materials and electronic devices, characteristics of different type of diodes, bipolar junction transistors. States/modes of operation of such devices, small signal circuit models, are also covered. Applications of these devices in basic electronic circuits: rectifiers, limiting and climbing circuits, regulated power supplies, electronic switches, and amplifiers are covered as well. Material will be introduced through textbook readings, then expanded upon in lecture. Student will learn to design, simulate, using Multisim Electronics Workbench, and implemented by building and testing small electronic circuits.

The course pre-requisite is “Electrical Circuit Analysis I (BBM041)” and must be taken concurrently with the course “Electric Circuit Analysis II (BBM042)” as a co-requisite course.

BBM045 Medical Electronics II

(2 L, 2T) 3 credits

This course builds on the concepts covering analysis and design of basic electronic circuits that are required in the design and implementation of biomedical equipment. The course review the theory and biasing techniques of BJT amplifiers with highlight on Q point, load line, Q point stability, and basic BJT amplifier configurations. The topics include the theory of Field Effect Transistors: FET biasing, FET amplifiers, multi stage circuits of BJT and FET amplifiers, differential amplifiers. In addition the course concentrate on the theory of ideal and practical operational amplifiers with emphasize on OP-amp operation modes, negative feedback, OP-amp limitations, basic OP-amp circuits, active filters, and Instrumentation Amplifiers. The main teaching strategies include lectures, tutorials, practical, computer simulations, dialogue, discussion, and practical projects. The course Must be taken concurrently with the course Medical Electronics Lab (BBM046). The course pre-requisites are Electrical Circuit Analysis II (BBM042) and Medical Electronic I (BBM044).

BBM046 Medical Electronics Lab

(2P) 1 credit

This course will cover basic experiments in electronic circuits field. It introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications. It also covers additional applications of analog electronic circuits with an emphasis on analog and mixed signal integrated circuits(IC). Topics include amplification, filtering, oscillation, voltage regulation, and other analog circuit.

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BBM011 Differential Equations

(2L, 2T) 3 credits

This course will provide student with fundamental concept of Differential Equations and foundational knowledge for engineering mathematics course. The course will focus on the following: Basic concepts of Differential Equations: Definition, types, order, power Solutions of Differential Equations of order one; Separate, Homogeneous and inhomogeneous, Exact and inexact, linear and nonlinear, General Solutions of Homogeneous Differential Equations of order two by use characteristic equation, Partial Solution of Inhomogeneous Differential Equations of order two by operator differentiation.

The prerequisite is BENG04.

BBM012 Engineering Mathematics

(2L, 2T) 3 credits

This course covers the transforms of Laplace and Fourier and their properties and inverses. Focusing on finding these transforms for the different types of functions, using these transforms in solving different systems(ordinary and partial differential equations) and some applications (electrical circuits and using MATLAB).

The functions of complex variables and analytic and harmonic functions are also considered. Some methods will be used in the teaching of this course, such as: Lectures, tutorial, Problems and exercises, Group Discussion, further reading in directed topics (by self) and PowerPoint presentation. The prerequisite is BBM011.

BBM021 Engineering physics

(2 L, 2T,2P) 4 credits

The general importance of this course is to provide students with the major concepts of Electrostatics and Magneto statics phenomena. It demonstrates various ways of calculating electric field, magnetic fields, electric and magnetic forces, electric potential, electric flux, magnetic flux.

The course carried out using the lectures and Problems solving, assignments, lab experiments, Simulation Experiments and self-learning used to teach this course.

Evaluation via Written and oral Examination, Assignments evaluation, Quizzes, Reports and observation.

The Prerequisite: BENG03.

BENG06 Engineering Mechanics

(2L, 2T) 3 credits

The general importance of this course is to provide students with physical background with the variable ways that help them to solve real problems.

This course includes concurrent force systems, Vectors, motion, work and energy, Impact, Rotational Motion and Rolling Motion.

The course carried out using the lectures and self-learning, Assignments, Problems solving, Brainstorming session and Group work used to teach this course.

Evaluation via Written and Oral Examinations, Assignments evaluation, Quizzes and observation.

The prerequisite: BENG03.

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BBM022 Biophysics

(2 L, 2T) 3 credits

This course provides student with the Introduction to Biophysics, and Medical Physics principles as applied to medical imaging and radiation therapy applications.

Topics will cover and focus on: Optics Principles, Laser properties and applications, Radiation, Ionizing Radiation, Radiation Safety, X-ray physics, X-ray production, Radioactivity, Radiation Therapy, Computed Tomography Physical principle, Nuclear Medicine physics and its applications, Ultrasound and Magnetic Resonance Imaging Physical Principles.

The course carried out using the lectures and self-learning, seminar, applied research and discussion, Brainstorming session, Miniature education, Solve problems, activation used to teach this course. Evaluation via periodic oral, written presentations, a final written and poster report.

The prerequisites of this course are Physics, Biology.

BBM023 Biomechanics

(2L, 2T) 3 credits

Biomechanics is one of the most important supporting subjects for the principles and practices of health technology. This course will provide an introduction to the mechanical behavior of biological tissues and systems. Specific topics include: Biomechanics of soft and hard tissues: structure, function and mechanical properties of biological tissues, Static Equilibrium, Mechanics of the cardiovascular system and Fluid mechanics. Problem solving skills will be emphasized through homework and assignments. Prerequisites are Mathematics, physics and Engineering Mechanics.

BBM042 Electrical Circuit Analysis II

(2 L, 2T) 3 credits

This course provides the students with basics concept and properties of AC electrical circuits, and their applications that are required in Biomedical engineering.

The course covers sinusoidal alternating waveforms, the basic elements and phasors, series, parallel and series-parallel AC circuits, network theorems (AC), power (AC), resonance and filters networks. The teaching strategies include: lectures, tutorials, problem solving and cooperative learning. Moreover student will learn to design, simulate and implement AC electrical circuits.

The course must be taken concurrently with the course Electrical Lab (BBM043). The prerequisite is BBM041.

BBM043 Electrical Circuits Lab

(2P) 1 credit

This course will cover basic experiments in electric circuits field , where provides students with measurements skills for voltage , current and resistance , and to able to calculate the error ratio between theoretical and practical values and principles of circuits connection methods practical .

This course will cover many of an important electric experiments such as: Ohm's Law ,Kirchhoff Low, Superposition theory ,Thevinen theory , Maximum power ,Charge and discharge capacitor and alternative values measurement by using oscilloscope .

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BBM031 Fundamentals of computer programming

(2 L, 2P) 3 credits

This course will introduce students the concepts, techniques and practical skills of problem solving using computer programming. Students of this course will be trained to develop computer programs that are applicable in many modern computing environments.

This course will cover introduction to computer and programming Hardware and software, introduction to Problem solving and computer programming, programming language elements, program flow control, object-oriented programming fundamentals, data structures and introduction to Graphical User Interface programming.

BBM063 Physiology and Anatomy

(2L) 2 credits

This course will be introduced the study of anatomy and physiology. Physiology is the study of how living organisms perform the various functions of life. Many important concepts are introduced in this study, including an introduction to the organ system, and body regions.

The course gives an overview on the physiology and anatomy of skeletal system, muscular system, respiratory system, digestive, renal systems, nervous system, reproductive system, cardiovascular system, and human skin and sensory organs.

The teaching includes lectures, presentations and activation.

BBM064 Physiology (lab)

(2P) 1 credit

This course provides continuation of the comprehensive study of the physiology of the human body. Topics include blood components, differences between plasma and serum, coagulation, blood clotting mechanism respiratory, anticoagulants, RBCs, WBCs and platelets account, packed cell volume (hematocrit), the erythrocyte sedimentation rate (ESR), blood groups, haemoglobin (Hb) estimation, arterial blood pressure, electrocardiogram measurement and digestive enzyme estimation.

Upon completion, students should be able to demonstrate an in-depth understanding of principles of physiology and their interrelationships.

Laboratory work includes dissections, of preserved specimens, microscopic study, physiologic experiments, computer simulations, and multimedia presentations.

BUST04 Leadership Skills Development

(1L) 1 credit

The course aims to develop some leading and administrating skills for the students, to develop the distinguish opportunities for them throughout knowing them with the leading and administrating character traits, most important methods and techniques of leadership and knowing them with strategies of distinguish and leading reaction.

In addition to, developing some of leadership and administration skills and morals that related to planning, self and others control, methods and techniques of taking the decisions, motivation techniques, change leadership skills and leadership and administration ethics.

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BBM211 Introduction to the Profession

(2L, 2T) 3 credits

This course will provide students with fundamental concepts of biomedical engineering and foundational knowledge for subsequent biomedical engineering course.

The course will focus on the following: Introduction to specializations within the field of biomedical engineering; History of biomedical engineering; BME and Ethics, Biosensors; Biosignals; Biomedical signal processing; biomechanics; biomaterials; Electrical safety in medical technology and Medical Ultrasound Imaging.

The form of participatory and active learning methods will be conducted via Lecturing; Interactive class Discussion, Brainstorming and project presentations will be prepared by students.

The prerequisites are BBM061 and BBM062.

BENG05 Statistics and Probability

(2L,2P) 3 credits

This course provides students fundamental of Statistics and Probability.

The course includes: displaying the data, measures of central tendency, measures of dispersion, correlation, simple regression, types of random variables and some probability distributions.

Some methods will be used in the teaching of this course, such as: lectures, problem-solving, Brainstorming, micro- assignments and micro-report.

BBM051 Biochemistry

(2L,2T) 3 credits

This course provides students with the necessary knowledge of the major topics in biochemistry.

The course focuses on the function of the major components of the living cells: proteins, carbohydrates, lipids, nucleic acid and the instruments of biochemical materials measurements. The teaching strategies include lectures, discussion, presentations and group work. The course requires chemistry and biology as Prerequisite .

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Third Year Courses

BBM311 Biomedical instrumentation I

(2L, 2T) 3 credits

This course provides an overview of typical biomedical instruments used in bio-measurement and an introduction to biomedical instrumentation principles, design, measurement and analysis techniques. This course includes: Basic concepts of instrumentation, measurement and analysis of biopotentials, applications of operational amplifiers for signal processing, origin of biopotential, Biological interface, electrode behavior and their circuit models, Blood Pressure and sound. The prerequisites are BBM061, BBM045.

BBM312 Biomedical instrumentation Lab I

(2P) 1 credit

This course provides students with an introduction to bioinstrumentation measurement techniques and processing biomedical signals. This course include : Photodiode, Phototransistor And Photocopier Light Measurement, bio- signals (ECG,EMG,EEG) source and simulation , measuring recordings elements Probes Contact , Insulation Circuits and Stepper Motor Control Experiments, brainstorming, and project are methods used to teach this course.

BBM314 Medical equipment (1)

(2L, 2P) 3 credits

This course will cover instrumental analysis equipment which has many applications in medicine, pharmacology and industry. This course provides students with fundamental principles of modern bio-Analytical instruments.

This course will cover the theory and application of instruments such as: visible, ultra violet, Infrared, Fluorimeter, Photometry, Atomic absorption spectroscopy, Chromatography, blood gas analyzer, blood cell counter.

Understanding of the Bio analytical methods will be enhanced by practicing in advanced medical laboratory. The prerequisites are BBM044 and BBM045, BBM052 and BBM051.

BBM313 Seminar in Biomedical Engineering

(2P) 1 credit

This course provides students' knowledge about variety topics and recent developments in Biomedical Engineering (BME). Topics include Telemedicine technique, Bioinformatics, Bio-nanotechnology, Recent MRI, CT-Scan, Mechanical Ventilator and principles Marketing of Medical equipment. Students attend this seminar actively so, they are asked to present a seminar on a subject of their choice, connected with one of the seminars. They are evaluated, among other criteria, on their scientific communication skills.

The prerequisite is BBM211.

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BBM047 Digital & Logic Design

(2L, 2P) 3 credits

This course introduces the students to logic design and the basic building blocks used in digital systems. This course explains how digital circuit of large complexity can be built in a methodological way, starting from Boolean logic and applying a set of rigorous techniques.

This course will cover introduction to information representation and number systems; logic gates and their time diagram and truth tables, Boolean algebra and switching theory, manipulation and minimization of completely and incompletely specified Boolean functions and combinational and sequential circuits analysis and design. Numerous examples and case studies will be used to illustrate how the concepts presented in the lectures are applied in practice, and need to accommodate different practically-motivated trade-offs can lead to alternative implementations. The students will apply their knowledge in the labs by building increasingly more complex digital logic circuits. The prerequisites are BBM031 and BBM045.

BBM324 Medical equipment (2)

(2L, 2P) 3 credits

This course will expand student's knowledge with different biomedical devices and its electrical safety standards. This course covers the principle of operation of some biomedical device like infusion pump, ventilator, incubator, patient monitor, pulse oximeter, phototherapy, pacemaker and defibrillator. Also it covers the electrical safety of these devices and the international standards. Understanding of these medical devices will be enhanced by practicing in two laboratories which are advanced medical laboratory and calibration laboratory.

The prerequisites are BBM044 and BBM045.

BBM326 Medical Equipment Fault Detection

(2P) 1 credit

This course will expand student's knowledge with the troubleshooting of different biomedical devices. This course covers the main malfunction of some biomedical device like infusion pump, ventilator, incubator, patient monitor, pulse oximeter, phototherapy, pacemaker and defibrillator.

The course carried out using lectures, self-learning, applied research, discussion, modeling and analysis are the methods used to teach course. Evaluation via periodic oral, written report and exams, and presentations. The prerequisites are BBM044 and BBM045 and BBM314.

BBM327 Engineering Training

(2P) 1 credit

This course provides students hands-on experience at site where biomedical equipment are utilized (hospitals and companies) under the supervision of a department member.

This course will cover training on medical devices in the following hospital departments: Dental, Laboratory, Radiology, Intensive Care unit, Operation room, Endoscopy and Hemodialysis.

Understanding of these medical devices will be enhanced by Field training.

The prerequisites are BBM313 and BBM314.

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BBM325 Biomedical Applications of MATLAB

(4P) 2 credits

This course will learn the students how to model the physiological systems into simplified linear models which can be analyzed and simulated with simulation program (e.g. MATLAB & SIMULINK). This course will cover introduction to physiological control systems, generalized system properties & mathematical modeling, linear models of physiological systems, static analysis of physiological systems, regulation of cardiac output, regulation of glucose and time-domain analysis of linear control systems. Students will primarily learn to analysis & model some human physiological systems through lectures and the mathematical analysis of that models will be simulated in the laboratory by SIMULINK program.

The prerequisites are BBM011, BBM048, and BBM063.

BBM049 Control system for BME

(2L, 2T) 3 credits

This course provides students with the concepts of control systems, and its application in physiological modeling. It covers the basic theories of a control system, also the concept of feedback action, closed-loop control versus open-loop control, using the Laplace transform to solve linear differential equations, deriving transfer function for linear time-invariant electrical system, mechanical, fluid, and thermal systems, discussing the effect of poles and zeroes, and how to find the time response using transfer function, and determine the stability of a system. The applications find the time response using transfer function, and determine the stability of a system. The applications of control systems in the biological field is covered in this course.

The teaching strategy of this course is achieved through lectures and tutorials, also this course is a part of the requirements of the upper program.

BBM040 Control Systems Lab

(2P) 1 credit

This course is intended to develop the students' skills in representing the control systems models using available software, convert from model to others, plotting the system's response and root-locus map, also analyze the time response of a system's transfer function, improve that response and its stability.

The prerequisite is BBM048.

BBM321 Biomedical Engineering Design

(2L, 2T) 3 credits

This course provides an integration of the engineering and life science backgrounds of biomedical engineering project through the presentation of design principles.

This course includes: Introduction to Design, Design strategy, reliability, process; project statement, specifications project planning, scheduling and division of responsibility, ethics, safety, environmental... considerations, and marketing. The lectures and self-learning, applied research and discussion, designing, periodic oral and written presentations are the methods used to teach course.

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BBM048 Digital Signal Processing

(2L, 2P) 3 credits

Daily equipment's in which the signals are stored and treated digitally are used. Digital Signal processing (DSP) is the mathematical manipulation of a discrete-domain information signal to modify or improve it in some way. This course introduces the techniques of modern digital signal processing that are fundamental to a wide variety of application areas (e.g. Biomedical Signals Systems). This course will cover introduction to discrete linear systems, discrete-time Fourier transform and linear time invariant systems, the Z transform, sampling and quantization, the discrete Fourier transform, properties of digital filters, finite impulse response (FIR) filters and infinite impulse response (IIR) filters. In order to help students to have good understanding of the DSP theories, laboratory sessions will be designed so that students could apply what they have learnt in lectures in a simulation program. This course will make extensive use of MATLAB as an analysis, design, and visualization tool.

The prerequisites are BBM012, BBM031.

BBM322 Biomedical instrumentation II

(2L,2T) 3 credits

This course provides an overview of the most biomedical sensors and an introduction to their principles, design, measurement and analysis techniques. This course includes: Introduction to Biomedical Sensors, physiological Transducers, Measurements of Blood Flow and Volume, Respiratory system, and Chemical sensors and Optical Sensors.

The lectures and self-learning, research and discussion, designing are the methods used to teach course. The prerequisites are BBM311, BBM312.

BBM323 Biomedical Instrumentation Lab II

(2P) 1 credit

This course provides an introduction of widely used biomedical sensors and their principles and usage. This course includes sensors of temperature, pressure, respiration and photo plethysmograph, also includes the biomedical physiological stimulators: defibrillator, magnetotherapeutic signals, ultrasound. The mini lectures, experiments, discussion, and project are the methods used to teach course.

The prerequisites are BBM311, BBM312.

BUST10 Research Methodology

(2L) 2 credit

This course is considered as one of the most study courses which help the scholar to achieve the graduation research and a questing him many information and knowledges about science and scientific research and its curriculum, developing the positive sides of the learner towards the scientific research. This is achieved throughout a group of activities (Teaching Methodology) such as, a method of dialogue, discussion and self-learning, search and applications by using the power point and evaluating the student throughout the class contribution, accompanied class and non-class duties and the semester and final exam.

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Fourth Year Courses

BBM412 Embedded System Application in BME (2 L, 2P) 3 credits

This course covers theoretical and practical topics of the Microcontrollers, Microprocessor registers, memory, and programmable input/output devices. Also it covers the Interrupts, Single chip controllers, Design and testing of software for microcontrollers. It also demonstrates the hardware/software design tradeoffs and issues and the individual design projects. The purpose of this course is to design biomedical system using one of the new engineering tools (Microcontrollers, Microprocessors, DSP, FPGA,..). Understanding of this course will be enhanced by practicing in Microelectronics lab.

Prerequisites: BBM044, BBM045 and BBM321

BBM421 Safety in BM equipment (2L, 2P) 3 credits

This course will provide the safety principles and standards in hospital and its procedures. Topics include: Definition of safety, Elements of safety, Safety publications and standards organizations, orientation to laboratory safety, Types of hazards in hospital and how to deal safely with risks, Electrical safety, Mechanical safety, Radiation safety, Biological safety, Training operators, Preventive and Corrective maintenance. The students will apply their knowledge in the lab and Field visits. Prerequisites : BBM314, BBM324 and BBM411

BBM422 Medical image processing (2 L, 2P) 3 credits

The increasing use of digital imaging systems to aid medical diagnosis explains the current importance of medical image processing in healthcare. Currently, in addition to the traditional methods of digital imaging such as CT or MRI, also analog imaging modalities, such as radiography, or endoscopy, resort to digital sensors. This course will cover introduction to image processing, image operations, biomedical imaging fundamentals, spatial processing and image restoration, segmentation, representation and description. In order to help students to have good understanding of the medical image processing theories, laboratory sessions will be designed so that students could apply what they have learnt in lectures.

Prerequisite: BBM048.

BBM413 Graduation Project I (1L, 2P) 2 credits

The Graduation Project is a critical component of the BME student experience and capstone experience for the program. Teams will work with advisers in various aspects of biomedical engineering including instrumentation, biomechanics, biotransport, and others. it will be emphasized; overview of engineering ethics, risk analysis, safety in design and FDA regulations will be reviewed. Part I focuses on the documentation design and simulation.

The course carried out using the mini lectures for team and self-learning , applied research and discussion, analysis are the methods used to teach course . Evaluation via periodic oral and technical report and presentations.

Prerequisites: BBM045, BBM321, BBM322 and BBM311

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BBM423 Graduation Project II

(1L, 2P) 2 credits

The Graduation Project II expands experience in prototype construction, engineering design validation testing, and commercialization aspects of medical product development.

Based on the design solutions proposed in Graduation Project 1, teams construct and evaluate a functional prototype(s), implement and technical simulations or related proof-of-concept devices. Performance verification testing :evaluate the design output against the Engineering Design Specifications. The course carried out using the mini lectures for team and self-learning, and discussion, analysis are the methods used to teach course . Evaluation via periodic oral and technical report and presentations.

Prerequisites : BBM321, BBM412 and BBM413.

BBM411 Medical Equipment (3)

(2L, 2T) 3 credits

The purpose of this course is to expand the student's knowledge with new biomedical imaging modalities, advantage, disadvantage, troubleshooting and the future modalities generation.

This course covers different biomedical imaging modalities like Ultrasound, X-ray, Mammography, fluoroscopy, CT, MRI, PET, SPECT.

Understanding of these medical devices will be enhanced by hospital visits with expertise in the field.

Prerequisites: BBM044, BBM045, BBM022.

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Elective Courses

BBML01 Biomedical Networks

(2L,2T) 3 credits

Using of networks is increased in last 10 years. This course will expand student's knowledge with different biomedical networks and its installation and troubleshooting. This course covers medical gases networks, DICOM, CMMS and HIS. Understanding of these medical devices will be enhanced by visiting hospital. Prerequisite: BBM031

BBML02 Biofluid mechanics

(2L, 2T) 3 credits

This course provide student with application of fluid mechanics principles to human systems, physiological phenomena, and mechanisms from an engineering perspective.

Course focus on: Introduction to of basic fluid mechanics concepts, cardiovascular systems, blood rheology, biofluid of flows, transport heat, and respiratory.

The course carried out using lectures, self-learning, applied research, discussion, modeling and analysis are the methods used to teach course. Evaluation via periodic oral, written report and exams, and presentations.

Prerequisites : BBM023, BBM062, BBM063 and BUST09

BBML03 Hospital management and granted system

(2L,2T) 3 credits

This course assists students in understanding management principles in the hospitals and health care delivery system. Topics include Process of management, Hospital Planning, Recruitment and training, Hospital Functions and Services (Clinical, Supportive and Auxiliary services), Legal Aspects in a hospital and Hospital Economics.

Students will get the knowledge in lectures, discussion, field visits, and assignments with presentations

BBML04 Modern hospital design

(2L,2T) 3 credits

Using of networks is increased in last 10 years. This course will expand student's knowledge with different biomedical networks and its installation and troubleshooting. This course covers medical gases networks, DICOM, CMMS and HIS. Understanding of these medical devices will be enhanced by visiting hospital.

Prerequisite: BBM031

BBML05 Biomaterials

(2L,2T) 3 credits

This course provides an introduction to biomaterials related to biotechnology, medicine, and understand interaction between materials and biological structures. Topics include: Introduction to biomaterials, biocompatibility, biomaterial Bulk and Surface properties, metals, ceramic, polymers, tissue-biomaterial interactions, Testing of biomaterials and applications of biomaterial in medicine. Students will get the knowledge in lectures, seminars, field visits, and assignments with presentations.

Prerequisites: BBM063, BBM064, BBM051 and BBM023

Head of Department Signature

Dean of the Faculty Signature



BBML06 Clinical engineering

(2L,2T) 3 credits

This course provides student with substantial clinical experiences and help him know equipment life cycle within healthcare environment. The course includes: Clinical engineering fundamentals, organizational structure and services of hospital, medical equipment management plan, medical instrumentation in hospital, aspects of equipment life cycle, and medical devices maintenance. The course carried out using the lectures and self-learning, and visit field, and project are the methods used to teach course. Evaluation via periodic oral and micro report of visiting field, and final written report.

Head of Department Signature

Dean of the Faculty Signature