بسم الله الرحمن الرحيم

Courses Description

Biomedical Engineering Department

Faculty of Applied Engineering & Urban Planning

University of Palestine

2017

Course Name:	Biology		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP2301	**Course Cr. Hrs.**	3
Course Description	The general concepts in biology, study of the common characteristics to the organisms living a hierarchy of levels of life and the scientific method for scientific research-based to the viewing build hypotheses, as well as study the molecules of life-supporting carbohydrate , fats , protein amino acids . the study of plant and animal cells and blood cells in addition to studying tissue , division (mitosis & meiosis) and general principles in genetics.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Learn the basic concepts of biology. 2. Learn the types of carbohydrates, fats, proteins and amino acids. 3. Learn the types of plant and animal cells and the structure of each of them. 4. Learn the types of hematopoietic cells and qualities of each. 5. Learn the types of plant and animal tissue and the structure of each of them. 6. Learn the Cellular division. 7. Learn cellular meiosis		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Know the basic concepts in biology and its relationship to other sciences. 2. Recognize the scientific method in the construction of hypotheses based on viewing and question. 3. Know the types of cells, installation and function of organelles within the cell. 4. Understand the functions of cells involved in blood composition and function of serum. 5. Recognize the types of cell proliferation and division (Meiosis and Mitosis), as well as the basic principles of genetics.		
Course Name:	General biology lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2301	**Course Cr. Hrs.**	1
Course Description	This course deals with the study of the practical side of most of the subjects are studied in gene biology course focusing on the study of light microscope , different composition of animal and cells, identify the different types of animal tissues including epithelial , connective , muscle ar Also include the study of macromolecules as proteins, carbohydrates and lipids and how to det them. As well as study the processes of photosynthesis in plants.		
Course Aims	To have enough information about the topics mentioned above so easily can understand the theoretical part of the biology		
Course Outcomes	Upon completion of this course, the student should be able to: easily treatment with microscop identification of different type of tissue, distinguishing between different macromolecule, understanding photosynthesis.		
Course Name:	Linear Algebra		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2303	**Course Cr. Hrs.**	3
Course Description	This course will cover a variety of topics in linear algebra, selected from Chapters 1, 2, 3, 4, 5, The topics covered include the linear system equations, Matrices, Determents, The theory of vi spaces , Eigen values and Eigen vectors and Linear Transformation. , This course will emphasize student preparation, critical thinking, and problem solving. To do v		

	the course, This course, as many other courses, will emphasize the written communication of ideas to othe
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Differentiate between linear and nonlinear systems. 2. Equivalent systems and elementary row operations. 3. Solving linear systems using augmented matrices. 4. Matrices and matrix operations. 5. Matrix multiplications. 6. The inverse of a square matrices. 7. Determinants by cofactor expansion. 8. Evaluating determinants by row reduction. 9. Properties of the determinant. 10. Application of determinants to systems. Cramer's rule 11. Vector spaces and sub spaces. **12.** Basis and dimension. **13.** The Eigen values of square matrix. **14.** Finding Eigen vectors and Eigen spaces. 15. Linear transformation.
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Linear systems and nonlinear systems. 2. Matrices and their properties and operations on matrices. 3. Determents and their properties and calculations. 4. Solving linear equations and their applications. 5. Finding Eigen values and Eigen vectors and their important. 6. Linear transformations.
Course Name:	Programming 1
Course Type:	Obligatory Department Requirement
Course ID.:	EQUP 2305 **Course Cr. Hrs.** 3
Course Description	Elementary introduction to programming. The characteristics of computers are discussed and students *design, code, and debug* programs using a high level programming language.
Course Aims	This subject is aimed at students with little or no programming experience. It aims to provide students with an understanding of the role computation can play in solving problems. It also aims to help students, regardless of their major, to feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals. The class will use the Python™ programming language.
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Familiar with programming in an IDE. 2. Familiar with program readability/understanding including program style/formatting and self-documenting code. 3. Familiar with debugging process. 4. Able to design and implement basic programming solutions including statements, control structures, and methods. 5. Able to develop simple GUI programs

	6. Able to instantiate and invoke objects from the Java API including strings.		
Course Name:	Electric Circuits 1		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2307	**Course Cr. Hrs.**	3
Course Description	Definitions and units. Experimental laws and simple circuits. Techniques of circuit analysis. Inductance and capacitance. Source-free RL and RC circuits. Applications. The Unit-step forcing functions. RLC circuits.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Identify linear systems and represent those systems in schematic form, 2. Apply Kirchhoff's current and voltage laws and Ohm's law to circuit problems, 3. Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents, 4. Perform node and loop analyses and set these up in standard matrix format, 5. Identify and model first and second order electric systems involving capacitors and inductors, 6. Predict the transient behavior of first and second order circuits.		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Provide the students the skills to analyze the electric circuits 2. Design and be able to correct and find the mistakes in the circuits.		
Course Name:	Electric Circuits 2		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2302	**Course Cr. Hrs.**	3
Course Description	**Topics covered include**: Sinusoidal steady state analysis, power calculations in sinusoidal circuits, complex power, balanced three phase circuits, Laplace transform, circuit analysis using Laplace transform, low pass filters, high pass filters, band pass filters, band rejected filters, bode diagram, two port circuits.		
Course Aims	The basic objective of this course is to introduce students to the fundamental theory and mathematics for the analysis of Alternating Current (AC) electrical circuits, frequency response and transfer function of circuits. Through the material presented in this course, students will learn: 1. The fundamental principles in electric circuit theory and to be able to extend these principles into a way of thinking for problem solving in mathematics, science, and engineering 2. To analyze analog circuits that include energy storage elements in the time and frequency domains, both theoretically and experimentally 3. Ways in which electrical engineering shapes and benefits society 4. To improve the oral, graphical, and written communication skills 5. how to work effectively both individually and in groups 6. To evaluate the personal learning process and understanding of the concepts and skills from class		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. To analyze single phase sinusoidal circuits. 2. To calculate the average and complex power in single phase sinusoidal circuits. 3. To analyze balanced three phase circuits applying single phase equivalent circuits.		

	4. To find the functional and operational Laplace transform of different circuits.		
Course Name:	Biochemistry.		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2204	**Course Cr. Hrs.**	2
Course Description	This course include fundamental organic chemistry of amino acids, carbohydrates, lipids and other important biochemical , the role and control of PH in biological solutions, fundamental biochemistry of proteins and enzymes, introduction to bioenergetics and metabolic pathways, and the replication, transcription, and translation of DNA		
Course Aims	This course focuses on the study of the living cells and biological molecules with an emphasis on their applications in chemical and pharmaceutical industries. Topics to be covered include cell biology and structure, fundamental biochemistry of proteins and enzymes, metabolic pathways and biosynthesis of metabolites, molecular biology including central dogma ,genetic code, protein synthesis and practical examples of industrial applications.		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Relate the importance of biochemistry in our life. 2. Describe the role of basic cell components, the physical and biochemical properties of proteins especially in their roles as enzymes. 3. Relate the major metabolic pathway and biosynthesis of economic importance of primary and secondary metabolites. 4. Relate the principles of storage and transmission of genetic information, the control mechanisms which operate at the level of gene expression. 5. Demonstrate laboratory skills, including basic cell culture technique.		
Course Name:	Electrical Circuits Lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2106	**Course Cr. Hrs.**	1
Course Description	Practical-based introduction to electrical circuits concepts. Topics include standard systems and units with basic measurement devices and tools, DC and AC circuits, Electric Charge, Electric Current, Electric voltage, Electric resistor, Ohm's Law, Parallel and series connection, Kirchhoff's Law, Superposition Principle, Thevenin Theorem, Norton Theorem, AC Signals, and Oscilloscope, also based on the some of the features of Resonance circuits such as RC, RL and RLC circuits.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Provide and acquire students the skills of dealing with scientific equipment and elec devices. 2. Help students to measure physical quantities and analyze electrical circuits with diff methods. 3. Equip students with the laboratory experiments. 4. Employ practical side; to support the theoretical part and linked together. 5. Teach student the chart data and extract and analyze the data from it. 6. Enhance the skills of writing good scientific reports.		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Define skills of using scientific equipment and devices. 2. The ability to measure the electrical elements and quantities and analyze complex el circuits. 3. Perform the laboratory experiments to study and understand the basic concepts of E		

	phenomena, DC & Ac waves, Electrical elements, and Electrical circuit analysis and simplification. 4. Employ practical side; to support the theoretical part and linked together; which hel student to understand and accommodate the physical facts and theoretical concepts. 5. Ability to express chart data and extract and analyze the data from it. 6. The ability to prepare scientific reports.		
Course Name:	Electronics 1		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2308	**Course Cr. Hrs.**	3
Course Description	1. Introduction to Semiconductors: Semi-conductors: N-type and P-type, PN Junction and Biasing. 2. The Diode and Diode Applications: Rectifiers : half-wave and full-wave, filters, Zener Diodes and its Applications. 3. Bipolar Junction Transistors (BJT): Construction & Operation & Characteristics-Parameters, Transistors(BJT) application as: Amplifier & Switch 4. Transistor Bias Circuits: DC operating point, Bias/Base, Bias/Emitter Bias/Voltage-Divider. Field-Effect Transistors (FET) and Biasing: Characteristics & Parameters & Biasing. The Metal Oxide Semiconductor (MOS) FET: Characteristic & Parameters & Biasing.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understand Semiconductor Basics, Diode Models Analyze/Design Diode Circuits. 2. Understand the basic principles and abstractions that are used to analyze and design electronic circuits and systems. 3. Understand the language of electrical engineering and how to formulate and solve basic electrical engineering problems. 4. Understand how electronic circuits and systems fit into the larger context of engineering careers.		
Course Outcomes	**Upon completion of this course, student will 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. Setup experiments to measure and verify semiconductor circuits 6. Work effectively in a team		
Course Name:	Differential Equations		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2310	**Course Cr. Hrs.**	3
Course Description	This course is introduction to the study of solution methods for ordinary different equations. Topics include: classification of ODEs, modeling and methods of solution of first-order linear and select nonlinear equations, general solution techniques for homogeneous and inhomogeneous linear equations with constant coefficients, solutions of linear systems, and Laplace transforms.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Learn elementary analytical solution techniques for the solution of ordinary differential equations (ODEs). 2. Understand the solution structure of linear ODEs in terms of independent		

	homogeneous solutions and non-homogeneous solutions. 3. Understand by exposure to examples how systems and phenomena from science and engineering can be modeled by ODEs		
Course Outcomes	**Upon completion of this course, student will be able to:** 1. Students have improved problem-solving skills, including knowledge of techniques for the solution of ODEs. 2. Students have an understanding of the importance of differential equations in the sciences and engineering. 3. Students are prepared for further study in science, technology, engineering, and mathematics.		
Course Name:	Biomechanics		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2212	**Course Cr. Hrs.**	2
Course Description	**The student should acquire a knowledge and understanding of:** 1. Scalars and vectors quantities and its unites in biomechanics, 2. Basic mechanical principles applied to human body,Newton's Laws and friction forces in the Joints. 3. Static and Equilibrium of Rigid body and human body, and its Applications to Muscles and Joint, 4. Center of Gravity of Humans, Base of Support, Levers in the Human Body, and Safe Mechanics Techniques for Human Body. 5. Properties of Materials and the effect of forces on the body (Tension, Compression, Shear), Stress and Strain and elastic modulus, 6. Elastic Strain Energy and Applications: Bone Fracture: Energy Considerations. 7. Introduction to Fluid Mechanics and Viscous Fluid Flow.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understanding and demonstrating the basic principles and concepts of biomechanics with easy and clear way. 2. Providing fundamental knowledge of biomechanics and its important in engineering professions. 3. Ability to use that understanding in the solution of biomedical engineering problems. 4. This course will form the base for further biomedical engineering courses.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Demonstrate an understanding of the basic principles and concepts of biomechanics. 2. Understanding the importance of biomechanics and its applications in different fields of biomedical engineering 3. Apply basic knowledge, techniques, and skills to solve real-world problems necessary for engineering practice. 4. Understand and apply biomechanics concepts,facts, and models, and use them as a foundation to further study.		
Course Name:	Electronics I Lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2114	**Course Cr. Hrs.**	1
Course	This course introduces the characteristics and applications of semiconductor devices and circui		

Description	Emphasis is placed on analysis, selection, biasing, and applications. Upon completion, students be able to construct, analyze, verify, and troubleshoot analog circuits using appropriate techniq test equipment.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understand Semiconductor Basics, Diode Models Analyze/Design Diode Circuits. 2. Understand the basic principles and abstractions that are used to analyze and design electronic circuits and systems. 3. Understand the language of electrical engineering and how to formulate and solve basic electrical engineering problems. 4. Understand how electronic circuits and systems fit into the larger context of engineering careers.		
Course Outcomes	**Upon completion of this course, student will 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. Setup experiments to measure and verify semiconductor circuits 6. Work effectively in a team		
Course Name:	Fundamental of Biomedical Engineering		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3309	**Course Cr. Hrs.**	3
Course Description	**The course covers:** 1. Academic Biomedical Engineering programs. 2. Definitions of Biomedical Eng. 3. Relationship to other disciplines 4. The aim of biomedical engineering 5. Diversity in the terminology 6. Historical background 7. Definitions of Biomedical engineer. 8. Important Skills of Biomedical Engineering. 9. Duties of Biomedical Engineers 10. The importance of BME. 11. The future's need of BME 12. Biomedical engineering Rankings 13. Work environment for BME 14. BIOMEDICALENGINEERING JOB OPTIONS 15. The special skills of maintenance BME. 16. The Disciplines of Biomedical Engineering 17. Moral and Ethical Issues 18. Definition and classification of biomedical devices. 19. Classification for a Complex Technology 20. The word of biomedical engineering.		

	21. Evolution of Medical Technology 22. Terminology and prefixes.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understanding and demonstrating the basic principles and concepts of Biomedical Engineering. 2. Providing fundamental knowledge of Biomedical Engineering and its important in BME professions. 3. Ability to use that understanding in the solution of biomedical engineering problems. 4. This course will form the base for further biomedical engineering courses.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Demonstrate an understanding of the basic principles and concepts of Biomedical Engineering. 2. Understanding the importance of Biomedical Engineering. 3. Apply basic knowledge, techniques, and skills to solve real-world problems necessary for Biomedical Engineering. 4. Understand and apply biomedical concepts,and use them as a foundation to further study.		
Course Name:	Electronics II		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3311	**Course Cr. Hrs.**	3
Course Description	Feedback principles and electronic circuit theory and device theory applied to multi-stage transistor amplifiers. Detailed study of operational amplifier specs, non-idealities, and compensation. Introduction to filter theory and practical realizations. Power supply design: rectifier circuits, linear and switching regulators. Nonlinear circuits: comparators, multipliers, Schmitt trigger, S/H circuits, multi-vibrators and oscillators. Introduction to noise analysis and low noise design. Emphasis on realization of designs using commercially available IC's. Design experience emphasized in projects and the laboratory.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Focus on the design of power transistors, amplifiers, filters, oscillators, and converters with an emphasis on design. 2. Describe diode operation and their use in circuits such as rectifiers and voltage limiters. 3. Explain the operation of BJTs and utilize their I-V characteristics to design single stage amplifiers. 4. Explain the operation of MOSFETs and utilize their I-V characteristics to design single stage amplifiers. 5. Analyze multistage amplifiers and calculate their gain and input/output resistances. 6. Design inverting and non-inverting amplifiers using Op Amps.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. This course contributes primarily to the students' knowledge of engineering topics, and does provide design experience. 2. Understood the basic knowledge of Op-Amp which basically used in most medical devices		
Course Name:	Electronics II Lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3113	**Course Cr. Hrs.**	1
Course Description	Advanced course on the analysis and design of electronic circuits. Topics include non-ideal Op amplifier characteristics, practical amplifier designs, linear/non-linear Op-Amp circuits, filters		

	tuned amplifiers, oscillators, signal generators, power output stages, etc. Circuit applications to areas as instrumentation, signal processing and conditioning, and control are considered. Key c concepts are experienced through laboratory work and a major design project, use of electronic simulation tools, and solving design problems
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Be familiar with multistage amplifier connections. 2. Know the AC analysis of BJT and JFET. 3. Be familiar with frequency response of BJT and JFET. 4. Introduce the concepts of an operational amplifier (op-amp). 5. Introduce the concepts of linear voltage regulators and their use. 6. introduce the concepts of using a switching regulator as a voltage regulator. 7. Introduce the concepts of using diodes as rectifiers and limiters. 8. Introduce the concepts of using an operational amplifier to perform filtering of electrical signals. 9. Introduce the concepts of using an operational amplifier as a voltage comparator. 10. To introduce the concepts of using the versatile LM555 timer as a monostable pulse generator, an stable oscillator and as a pulse width modulator. 11. Be familiar with Diac and Triac with their use. 12. Learn about power amplifiers types and its characteristics.
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Analyze amplifiers for frequency response 2. Identify, select, and handle transistors and ICs 3. Analyze feedback circuits 4. Analyze amplifier circuits 5. Analyze oscillator circuits 6. Test semiconductors using a curve tracer 7. Assess component acceptability for circuit use 8. Operate basic test equipment 9. Express absolute and relative power and voltage levels in decibels 10. Perform graphical analysis of measured data 11. Fit curves to recorded data
Course Name:	Digital Logic Design
Course Type:	Obligatory Department Requirement
Course ID.:	EQUP 3215 **Course Cr. Hrs.** 2
Course Description	An introductory course in digital logic circuits, numbering systems and base conversions, Boolean algebra, truth tables, logic circuits and implementation, Karnaugh maps (and other strategies of minimization), sequential logic, flip-flops, registers, counters, programmable logic devices, and characteristics of logic families.
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. The fundamental the fundamental working principles of digital communication systems and be able to extend these principles into a way of thinking for problem 2. To basic parameters and considerations involved in the design of digital systems both theoretically and experimentally. 3. Ways in which electrical communications shapes and benefits society.
Course Outcomes	**Upon completion of this course, the student should be able to:**

	1. Design efficient combinational and sequential logic circuit implementations from functional description of digital systems 2. Carry out simple CAD simulations to verify the operation of logic circuits 3. Carry out arithmetic computations in various number systems (binary, octal, hexadecimal) 4. Apply rules of Boolean algebra to simplify Boolean expressions 5. Translate Boolean expressions into equivalent truth tables and logic gate implementations and vice versa.		
Course Name:	Digital logic design Lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3117	**Course Cr. Hrs.**	1
Course Description	**The student should acquire a knowledge and understanding of:** 1. Digital logic design lab components such as breadboard, Ic's, 7-segment and Led. 2. Operation of digital gates including AND, OR, NAND, NOR and XOR gate. 3. Learn how to simplify functions and implement those using basic gates. 4. Using Karnaugh map in function simplification. 5. Implementing different functions using NAND and NOR gates only. 6. Displaying numbers and counters on 7-segment. 7. Learn the different application of timer circuit. 8. Using multiplexers and decoders in digital circuits. 9. Operation of flip-flop circuits.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understanding and demonstrating the basic principles and concepts of digital logic circuits. 2. Providing fundamental knowledge of gates and their use in implementing functions. 3. Ability to use that understanding in implanting various projects. 4. This course will form the base for further biomedical engineering courses.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Demonstrate an understanding of the basic principles and concepts of digital logic circuits. 2. Understanding the importance of gates and their usage in implementing functions. 3. Apply basic knowledge, techniques, and skills in projects related to biomedical engineering.		
Course Name:	Measurements and Sensors for Biomedical Engineering		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3319	**Course Cr. Hrs.**	3
Course Description	This course will cover various systems of the human physiology, signals of biologicalorigin obtained from these systems, biosensors, transducers, bioelectrodes used toAcquire such signals, amplifiers for measuring biopotentials, the fundamental principles of biomedical measurements; and sensor instrumentation electronics.		
Course Aims	**Course seeks to enable students to achieve the following objectives:**		

	1. To provide knowledge of the principles associated to some measurement of interest in the biomedical field. 2. Understand the engineering methods used to measure blood pressure, sound, flow and other parameters from living systems. 3. Understanding the origin and measurement of the biopotential. 4. To provides basic information about bioinstrumentation. 5. To provide basic knowledge of the scientific principles and the practical aspects of transducers and physiological monitoring techniques. 6. To impart knowledge and understanding on the design and function of practical clinical sensors and transducers. 7. To impart knowledge on the theory of commonly used physiological monitoring techniques.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Discuss the definitions/specifications by which sensors are characterized. 2. The students will be capable of Understanding measurement error and uncertainty. 3. Describe common methods for converting a physical parameter into an electrical quantity 4. and give examples of transducers, including those for measurement of temperature, strain,motion, position and light. 5. Present different methods for measuring temperature, pressure, force, flow and other important parameters in determining the circulation-, breathing- and excretory functions. 6. Describe how different measurement techniques are used to determine the vital parameters of diagnostic importance. 7. Understand the characteristics of different sensors and designs for recording BP, respiratory parameters and analyze the recorded signals 8. Provide an engineering approach to develop biomedical measurement systems.		
Course Name:	Anatomy & Physiology		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP3316	**Course Cr. Hrs.**	3
Course Description	Human Anatomy and Physiology is an introduction to the study of anatomy and physiology of humans. , and the levels of organization in the human body are studied. The anatomy and physiology of the integumentary, muscular, circulatory and immune systems are covered. **Course Content**: 1. The organization of the human body beyond the cellular level 2. The integumentary system 3. The muscular system 4. The physiology of muscle contraction. 5. The circulatory system 6. Blood pressure and pulse. 7. Resistance and Immunity 8. Non-specific versus specific resistance. 9. The nature and roles of cellular and humoral specific immunity.		
Course Aims	**Course seeks to enable students to achieve the following objectives:**		

	provide the student with an in-depth study of the anatomy and physiology (structure and function) of the human body.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Use anatomical terminology to identify and describe locations of major organs of each system covered. 2. Explain interrelationships among molecular, cellular, tissue and organ functions in each system. 3. Describe the interdependency and interactions of the systems. 4. Explain contributions of organs and systems to the maintenance of homeostasis. 5. Describe modern technology and tools used to study anatomy and physiology.		
Course Name:	Practical Anatomy & Physiology		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP3016	**Course Cr. Hrs.**	0
Course Description	This practical course is meant to provide basic information for novice body components of the cell and chemical compounds within it, moving to the members and the hardware components of the body, such as the one bone and muscle, skin and functions of each of them and their relationship with each other. It also focuses on balance and control devices in the body.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** Provide the student with an in-depth study of the anatomy and physiology (structure and function) of the human body.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Use anatomical terminology to identify and describe locations of major organs of each system covered. 2. Explain interrelationships among molecular, cellular, tissue and organ functions in each system. 3. Describe the interdependency and interactions of the systems. 4. Explain contributions of organs and systems to the maintenance of homeostasis. 5. Describe modern technology and tools used to study anatomy and physiology.		
Course Name:	Fluid Biomechanics		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3218	**Course Cr. Hrs.**	2
Course Description	**The student should acquire a knowledge and understanding of:** 1. Fundamental of Fluid Mechanics and Viscous Fluid Flow. 2. Basic bio-fluid principles applied to human body. 3. Properties of bio-fluid and the effect on the body.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understanding and demonstrating the basic principles and concepts of Fluid Mechanics with easy and clear way. 2. Providing fundamental knowledge of bio-fluid and its important in engineering		

	professions. 3. Ability to use that understanding in the solution of biomedical engineering problems. 4. This course will form the base for further biomedical engineering courses.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Demonstrate an understanding of the basic principles and concepts of bio-fluid. 2. Understanding the importance of bio-fluid and its applications in different fields of biomedical engineering 3. Apply basic knowledge, techniques, and skills to solve real-world problems necessary for engineering practice. 4. Understand and apply bio fluid concepts,facts, and models, and use them as a foundation to further study.		
Course Name:	Medical Physics		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3320	**Course Cr. Hrs.**	2
Course Description	This course explores the fundamental modes of interaction between ionizing radiati electromagnetic and particulate) and matter, with an emphasis on the physics of energy abso medical applications. Topics will include exponential attenuation, x-ray production, and i chambers, and radiation protection, gamma camera, sound power and intensity, Doppler eff soundWaves and characteristics, types of waves, MRI		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understanding the interaction between radiation and matter 2. General use of medical equipment's 3. The meaning and use of ionizing and nonionizing radiation 4. How to protect our self from all different radiation.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Students have an understanding of the importance of the physics in medicine 2. Students are able to differentiate between the Principe and use of medical equipment's.		
Course Name:	Electromagnetic		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3322	**Course Cr. Hrs.**	3
Course Description	This course explores electromagnetic phenomena in modern applications, including wireless and optical communications, circuits, computer interconnects and peripherals, microwave communications and radar, antennas, sensors, micro-electromechanical systems, and power generation and transmission. Fundamentals include quasistatic and dynamic solutions to Maxwell's equations; waves, radiation, and diffraction; coupling to media and structures; guided waves; resonance; acoustic analogs; and forces, power, and energy.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. Understand the big ideas of electromagnetics, including: • Static and dynamic electromagnetic (EM) fields, energy, and power • EM fields and waves within and at the boundaries of media • EM radiation and propagation in space and within transmission lines • Circuit behavior of simple EM devices and transmission lines		

	• EM forces on charges, currents, and materials; mechanically produced fields • Photon behavior 2. Relate the big ideas of EM to economically important applications, including: • Wireless and wired communications systems • Electronic circuits and systems, analog and digital • Actuators (motors) and sensors (generators) • Optical and acoustic devices and systems 3. Exercise mathematical skills, including: • Vectors and phasors • Partial differential equations
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Fields and energies in simple planar, cylindrical, and spherical geometries 2. Fields within conducting, anisotropic, and plasma media 3. Resistors, capacitors, inductors, transformers, transmission lines, and resonators 4. Electric and magnetic forces on charges, wires, and media 5. Electric and magnetic motors and sensor/generators 6. Sinusoids and transients on TEM lines with mismatched impedances and tuning 7. EM fields at planar boundaries and within waveguides, including evanescence 8. Wireless and wired systems for communicating at R bits/second 9. Wire, aperture, and array antennas for transmission and reception 10. Simple photonic and acoustic devices In most cases students will derive these results from Maxwell's equations and the Lorentz force law, and will demonstrate their achieved outcomes in homework problems and, on a random sampling basis, examinations.
Course Name:	Microcontroller & Microprocessor
Course Type:	Obligatory Department Requirement
Course ID.:	EQUP 3324 **Course Cr. Hrs.** 3
Course Description	1. This course deals with microprocessors and microcontrollers as well as embedded organization, programming and design. 2. Introduction to microprocessors and microcontrollers, Embedded Controllers and application, Instruction Set and Register Set for microprocessors and microcontrollers, programming microprocessors and microcontroller, microprocessor and microcontrollers Hardware Configuration, Resets and Interrupts, Clock and Timer Systems, Memory maps, Analog-To-Digital (A/D) and Digital- To analog (D/A), Converters, parallel interfacing , serial interfacing, microprocessor and microcontroller applications.
Course Aims	**Course seeks to enable students to achieve the following objectives:** Provide the student with the basic understanding of embedded systems design. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications. Learning the concepts will be enforced by a Project to design and develop an embedded system based on a single-chip microcontroller or microprocessor.

Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Understanding principles of embedded systems design; be aware of architectures and behaviors of embedded systems. 2. program a microcontroller using Micro C, including hardware configuration and interrupt service routines,		
Course Name:	Microcontroller & Microprocessor Lab		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 3324	**Course Cr. Hrs.**	0
Course Description	This is a lab, which comes as hands-on experience on topics that are theoretically covered in the microprocessor and microcontroller design course. During this lab course, the student utilizes a real 8-bit microprocessor and microcontrollers, different types of application, ranging from sensing simple environment parameter such temperature to controlling simple systems using closed loop controller such as room temperature.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** 1. The main objective of this course is to provide the student with the basic understanding of embedded systems design. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications. 2. Design and develop a Project of an embedded system based on a single-chip microcontroller or microprocessor. 3. The student will study the programmable language such as Assembly, Pic Basic and Micro C.		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Understanding principles of embedded systems design; be aware of architectures and behaviors of embedded systems. 2. program a microcontroller using Micro C, including hardware configuration and interrupt service routines, 3. Microprocessor technology is an exciting, challenging and growing field which will pervade industry for decades to come. Ever since, the invent of first microprocessor to the latest, microprocessors have been used in different applications. 4. This practical course of microprocessor and microcontrollers presents an integrated approach to hardware and software in the context of 8086 microprocessor and 8051 microcontroller.		
Course Name:	Biomaterials Science		
Course Type:	Obligatory Department Requirement		
Course ID.:	EQUP 2326	**Course Cr. Hrs.**	2
Course Description	This course provides a broad perspective about an overview for biomaterials engineering and processing, classes of material used and application of materials in medicine, biology, and artificial organs.		
Course Aims	**Course seeks to enable students to achieve the following objectives:** To introduce student to biomaterials. Emphasis will be on the understanding of what is a biomaterial, how it is processed, how it behaves under loadings and usage in design for broken or failure parts of the human body		
Course Outcomes	**Upon completion of this course, the student should be able to:** 1. Classify the biomaterials and recognize their production and properties 2. Explain the application areas of biomaterials 3. Develop a skill to prepare and explain a presentation topic about biomaterials 4. Recognize the importance of relationships between living tissues and biomaterials 5. To understand the importance of biomaterials for the society		

	6. To realize the important basic properties and requirements for biomaterials