

BIOMEDICAL ENGINEERING UNDERGRADUATE COURSE CONTENTS

1st SEMESTER

BMM101 Introduction to Biomedical Engineering (3-0-3)

Introduction of university, engineering faculty and the department, the history and development of Biomedical Engineering with the development of Science and Technology. Medicine, Engineering, and their relations with basic sciences. Main working areas, library research and presentations of the students about the basic concepts and techniques.

BMM 103 Basic Computer Technology (1-2-2)

Introduction to computer (definition, historical development and types of computer), Computer hardware (motherboard, processor, memory, hard drive, video card, sound card, network card, modem, cd/dvd drive/burner, floppy drive, keyboard, mouse, monitor, speaker, microphone, printer, scanner, plotter) and Software (software types, operating systems, application software, programming languages), Operating systems, Windows 2000 operating system, Office programs and applications, word processors (Microsoft Word, and applications), data and graphics processors (Microsoft Excel and applications).

BMM 105 Biology for Engineers (3-0-3)

Cell and Intracellular organization, proteins, nucleic acids, carbohydrates, lipids, cell chemistry and biosynthesis, communication between cells and cell cycle, cell division, DNA and chromosomes, DNA replication, repair and recombination, DNA transcription, translation, cell imaging.

FIZ 183 Physics 1 (3-0-3)

The SI System, dimensional and unit analysis, vectors, circular motion in one and two dimensions, Newton's laws and their applications, energy and work, conservation of energy, linear momentum and collisions, rotational motion, angular momentum and torque, static balance and flexibility, harmonic motion, introduction to thermodynamics.

FIZ 191 Physics 1 Laboratory (0-3-1)

Measurement, addition of forces (vectors), balance of parallel forces, the principle of moments, motion on inclined plane, investigation of potential energy changes and simple harmonic motion in a coil spring, collision in two dimensional space. moment of inertia, center of mass, angular velocity and acceleration.

KIM 193 Chemistry (3-0-3)

The elementary principles to understand the chemical structure, properties and reactions of the matter. Atomic theory, the periodic table, types, formations and structures of chemical compounds, chemistry of solutions, gases, liquids and solids, thermochemistry and the basic concepts of thermodynamics, reaction rates, acid-base concept and principles of chemical equilibrium.

MAT 181 Mathematics I (4-0-4)

The basic rules of mathematics and functions, mathematical model development and improvement of problem-solving skills, functions, graphical functions, trigonometric functions and applications, inequalities, equations with multiple variables, logarithms, coordinate system, complex numbers, concept of limit, derivative and integral, curve sketching.

TÜR 181 Turkish I (2-0-2)

Historical development of Turkish language, Turkish territory, research areas on the Turkish language, Turkish symbols and sound characteristics, foundations of Turkish speech.

YDL 185 Foreign Language I (2-0-2)

This course includes development of necessary skills and strategies with various activities to reinforce grammar knowledge recognizing correct structures grammatically and linguistically, usage four skills consisting of "reading", "speaking", "writing" and "listening" in meaningful texts to reinforce the language learning process, usage and development of some strategies, such as "reading by calling" and "further reading", mobilization of mental abilities for the interpretation of texts, strategy development in vocabulary learning, keeping in the memory, using when needed, predicting unknown words in new texts, using functions of language.

2nd SEMESTER

FİZ 182 Physics II (3-0-3)

Electric charge, matter and electric fields, Coulomb's law, Gauss's law, electric potential, capacitance and capacitors, current and resistance, alternating current, electromotive force, electromagnetic induction and magnetic fields, Ampere's law and Faraday's law, introduction to electromagnetic waves, Maxwell's theory, optics.

FIZ 192 Physics II Laboratory (0-3-1)

Ohm's Law, Kirchoff's laws, resistance measurement method and Wheatstone bridge, current and voltage measurements, electrolysis, alternating current circuits, exponential and the electric field lines, magnetic fields, resistance - capacitance circuits, wire diameter for maximum current.

BMM 102 Material Science and Technology (3-0-3)

Need for materials science and position of materials science in engineering, Mechanical properties of materials, the structure of atom, attractive force between atoms(atomic bonds), classification of materials in terms of attractive forces between atoms, the electrical properties of materials, semiconductors, dielectric properties, magnetic properties, optical properties, thermal properties.

BMM104 Computer Programming (3-2-4)

History of computer, programming languages, Algorithms, Introduction to C and C language data types, operators and their priorities, loops and condition assessment.

MAT 182 Mathematics II (4-0-4)

Definition of definite integral and fundamental concepts and theory of integral calculus. definition of indefinite integrals and basic integration formulas, various methods of integration, applications of definite integrals, convolution, basic properties of Laplace transform, sequences and infinite series and investigation of their convergence, area of surface of revolution, power series of functions and their convergence, Taylor formula, the maximum error calculations.

BMM 106 Engineering Ethics (3-0-3)

This course gives the information on how to analyze and discuss some ethical issues which are exposed by the crisis of the modern sciences and scientific activity, with a focus specifically on engineering ethics.

TUR 182 Turkish II (2-0-2)

Turkish literature, speeches and statements about Turkish language.

YDL 186 Foreign Language II (2-0-2)

This course, as a continuation of course YDL 184, includes development of necessary skills and strategies with various activities to reinforce grammar knowledge recognizing correct structures grammatically and linguistically, usage four skills consisting of "reading", "speaking", "writing" and "listening" in meaningful texts to reinforce the language learning process, usage and development of some strategies, such as "Reading By calling" and "further reading", mobilization of mental abilities for the interpretation of texts, strategy development in vocabulary learning, keeping in the memory, using when needed, predicting unknown words in new texts, using functions of language.

3rd SEMESTER

BMM 201 Circuit Theory (3-0-3)

Circuit variables, circuit elements, circuit analysis techniques, inductance, capacitance and mutual inductance, natural and unit step response of first order RL and RC circuits, natural and unit step response of serial and parallel RLC circuits, op-amp circuits.

BMM 203 Circuit Laboratory (0-4-2)

Introduction of measuring instruments, series equivalents and parallel equivalents, combinational equivalents, nodal analysis, mesh analysis, Thevenin Theorem, Norton Theorem, maximum power theorem, superposition theorem, natural responses of first order RL and RC circuits, step responses of first order RL and RC circuits, natural and step responses of series RLC circuits, natural and step responses of parallel RLC circuits.

BMM 205 Numerical Analysis (2-1-3)

The expression of numbers on the computer, Error analysis, Calculation of the series, Solution of linear and nonlinear equation systems, Interpolation methods, Numerical differentiation and integration, Numerical solution of differential equations.

BMM 207 Medical Biology (2-0-2)

Biomolecules, structure, properties and functions of cells, cell metabolism, function and structure of the cell membrane, photosynthesis, respiration and fermentation; cell division, The developmental mechanisms of bacteria and virus, Molecularbiology: analysis of proteins and nucleic acids, microorganisms at the molecular levels, The molecular basis of genetics, Gene transfer techniques, Mechanisms of DNA replication and human genetics.

BMM 209 Engineering Mathematics (4-0-4)

Ordinary differential equations, first order differential equations, second order differential equations, high-order differential equations, linear differential equations, systems of differential equations, series solutions of differential equations. Basic properties of Laplace transform, power series of functions and their convergence, Taylor formula, the maximum error calculations, Laplace transform, Special functions (Sturm-Liouville theory and eigenfunction expansions), Differential equations (Cauchy-Euler equations), Fourier analysis, Boundary value problems of partial differential equations, Complex sequences and series (Taylor and Laurent expansions).

BMM 211 C Programming (3-0-3)

Programming concepts, Algorithms, Flowcharts, Data Types, Constants, Operators, Simple data inputs and outputs, Program control, Strings, Indicators, Functions, Structures and unions, Disk files, Preprocessor, Conditional compilation.

YDL 285 Foreign Language III (4-0-4)

English terms and English reading materials used in the Biomedical Engineering, relative clauses, describing functions and purposes, time clauses, cause and effect, reason and result connectives.

AİT 281 Principals of Atatürk and Revolution History I (2-0-2)

Ataturk's principles and revolutions in the modern history of Turkish Republic.

BMM 901 Robotics in Biomedical Engineering (Free Elective) (2-0-2)

Introduction to Robotics, Robotics mechanics, robot electronics, mechatronic design techniques, medical applications of robots.

4th SEMESTER

BMM 202 Transport Phenomena in Biological Systems (3-0-3)

Transfer of Momentum, Newton's Law of Viscosity and Continuity, Motion and Mechanical Energy Balances, Energy Transfer: Thermal Conductivity and Fourier's Law, Energy Balance. Mass Transfer; diffusivity and Fick's Law, bilateral and multi-component systems. Momentum, Energy and Mass Transfer Equations with Applications in Biological Systems.

BMM 204 Human Physiology (3-0-3)

Introduction to physiology: an introduction to the human body, cells and tissues, the skeletal system, bones constituting the skeleton, musculature and muscle physiology, muscles and functions of the muscles that make up the body, the body and upper extremity, the nervous system and functions of the nervous system, endocrine system, the physiology of the circulatory system, respiratory system, the digestive system, excretory and reproductive system.

BMM 208 Logical Circuits (3-0-3)

Analog-digital comparison, Binary arithmetic, Logic gates, Boolean algebra, Boolean expansions of functions and canonical, Relay circuits, Electronic-logic elements, Combinational analysis and synthesis of the circuit, Sequential logic circuits: state tables and diagrams. several memory elements, Sequential circuit types, The synthesis of sequential circuits.

BMM 210 Probability and Statistics (3-0-3)

Counting Techniques; the multiplication rule, permutations, combinations, The Concept of Probability; sigma algebra, probability axioms, conditional probability, Bayes' formula, Random variable, probability distribution function, probability density function, the Chebyshev inequality, Discrete and continuous distributions; uniform, Bernoulli, Poisson, geometric, hypergeometric distribution, normal distribution, exponential distribution, gamma and beta distributions, Generating Functions, Decision Theory, The concept of estimation, Hypothesis Testing, Non-parametric tests, Correlation and

Regression, Frequency Distribution and the frequency histogram, Numerical Methods in data identifying, Curve Fitting and Least Squares Method

BMM 212 Thermodynamics (3-0-3)

Microscopic and macroscopic description, the Zeroth Law of Thermodynamics and Temperature, Simple Thermodynamic Systems, the First Law of Thermodynamics, Work and Heat, thermodynamic processes, Kinetic Theory of Ideal Gases and Molecular distribution functions, the Second Law of Thermodynamics, Engines, Entropy, Thermodynamic Potentials, Open Systems and Phase Stability.

BMM 214 Practical Training 1 (0-0-0)

In this internship, it is expected to take part in tasks that require active participation such as hardware, design, production line work, calibration, quality testing, and to realize the importance of work integrity and to report experience gained properly. In addition, it is expected to observe works in engineering business. Duration of training is 20 working days.

YDL 286 Foreign Language IV (4-0-4)

Professional technical reading, writing and speaking, foreign language for daily and professional life.

AIT 282 Principals of Ataturk and Revolution History II (2-0-2)

Ataturk's principles and revolutions in the modern history of Turkish Republic.

BMM 902 Recent Topics in Biomedical Engineering (Free Elective) (2-0-2)

The history of Biomedical science, its relationship with other branches of science which BM has interaction with, biomedical engineering in both developed and developing countries, biomedical engineering in our country, specific applications in biomedical engineering, the secrets of the brain, cloning.

5th SEMESTER

BMM 301 Biomaterials (3-0-3)

Relationship between Materials science and medicine, characteristics of crystal and noncrystal materials, natural biomaterials, artificial biomaterials, applications of materials science in orthopedic surgery, mechanical, corrosive and surface properties and tissues interactions of polymer, ceramic, synthetic and other implant materials, cardiology and material science, applications of materials science research methods in medicine.

BMM 303 Biomechanics (2-0-2)

Application methods of engineering mechanics in human musculature and skeletal system, mechanical specification of tissues, structural features and mechanical analysis of Bones, muscles, and joints, Dynamics of mechanical systems, examination of Orthopedic materials according to mechanical properties, material stresses and strains, Introduction of the pending problems within the major research areas related to Biomechanics.

BMM 305 Signals and Systems (3-1-4)

Mathematical representation of continuous and discrete-time signals, conversion to independent values, single and dual signal conditions, and characteristics of the unit step and unit impulse function and examination of their features, Examination of the relationships between the systems, Linear and

time-independent systems, representation of discrete-time signals in the form of Impulse signals, Properties of linear and time-independent systems, representation of Random, linear and time-independent systems in the form of differential and difference equations, Block diagram representation of linear and time-independent systems, Fourier series representation of continuous and discrete-time signals, the Fourier transforms of continuous and discrete-time signals, Filtering, sampling the continuous-time signals and recreation of Continuous-time signals by sampled signals, Laplace-transform and Z-transform.

BMM 307 Bioelectricity (3-0-3)

Bioelectric sources, bioelectric field produced by a single cell in the tissue, The generation of Action potential and its advancement along the fibers, Cylindrical structures and the Potential generated within them, Transmission line theory, Body surface potential and correlation with cardiac sources, Potential of non-homogeneous environments, Electrocardiogram, Reciprocity, The forward and inverse problems, Impedance plethysmography, Impedance Tomography, Numerical methods, Image method.

BMM 309 Electronics (3-0-3)

Types of semiconductor diode, power supply, voltage multipliers, common emitter circuit, common base circuits, common collector circuits, biasing of transistors, transistor amplifiers, multiple amplifiers, class A-B-AB-C power amplifiers, field effect transistors (JFET), metal oxide FETs (MOSFET, MESFET), the FET biasing, FET amplifiers, small signal equivalent circuits, digital processing blocks and the basic definitions.

BMM 311 Electronics Laboratory (0-4-2)

Power supply design, FET amplifiers, transistor amplifiers, operational amplifiers, digital circuits and Boolean logic, binary logic circuits, non-linear applications of operational amplifiers, clipping and clamping circuits.

BMM 313 Nanomaterials (3-0-3)

Nanomaterials and nanostructured materials, learning main devices used in the characterization of these materials with theory and practice, In scope of the course importance of nanostructured biomaterials in chemistry, physics, biology and engineering, nanobiotechnological and biomedical applications of these with theoretical lectures, discussions and presentations is intended to explain and teach.

BMM 315 Radiation Physics (3-0-3)

The necessity of Radiation Physics, basic mathematics of radioactivity, basic physics and types of ionizing radiation, radiation exposure and dose concepts, the main calculation method on prevention of radiation, dose calculation due to radioactivity in the body, models for radiation propagation through the atmosphere, calculations for activation analysis, Counting Errors in Radioactivity, non-ionising radiation

BMM 317 Object Oriented Programming (3-0-3)

Introduction to C #, C # and programming techniques, object-oriented programming concepts, Graphical User Interface Design, Generics, Collections, LINQ, Files.

BMM 319 Microprocessors (3-0-3)

Microprocessor Technology. Number systems and digital circuits. Basic structure and operation of microprocessor. Arithmetic Logic processing unit. Memory unit. Microprocessor architecture. Microprocessor instruction set and programming techniques. Microprocessor data communication standards. Microprocessor peripherals. Microprocessor based industrial systems and applications.

BMM 903 Introduction to Biomedical Technology (Free Elective) (2-0-2)

The birth of biomedical science and its development, ethical issues which should be taken into consideration about product development and introduction.

6th SEMESTER

BMM 302 Medical Device and Imaging Systems

(3-0-3)

Fundamentals of medical imaging, Medical image processing, X-ray imaging and computed tomography (CT), Magnetic resonance imaging (MRI), Ultrasound imaging, Color Doppler echocardiography, Nuclear medicine and gamma cameras.

BMM 304 Digital Signal Processing

(3-2-4)

Discrete-Time Signals and Systems, Discrete-Time Linear, Time-Invariant Systems, Vertical Vector and Signal Space, Sampling and Aliasing in Time and Frequency Domains, Z-transform, applications of Z-Transform, Discrete Fourier Transform, Fast Fourier Transform, Implementation of Digital filters, General Principles of Digital filter design, FIR filter design methods, IIR filter design methods, effects of limited word length on digital filters

BMM 306 Electronic Circuits

(3-0-3)

Operational Amplifiers (OP-AMP), High Frequency equivalent of Transistor and FET, frequency response in amplifiers, the effect of binding and bridging capacitors, Miller theorem, transistor amplifier gain change with respect to frequency, bandwidth in multi-layer amplifiers, compensation with RC and LC elements, base compensation, Emitter compensation, series and parallel compensation, types of feedback amplifiers, stability of feedback amplifiers, Oscillators.

BMM 308 Electronic Circuits Laboratory

(0-4-2)

Voltage Amplifiers, feedback in transistor amplifiers, Stability of negative feedback amplifiers, Audio frequency power amplifiers, Linear regulated Alternating Voltage generators, Electronic Counters, Phase Clamping Circuits, High-Frequency Power Amplifiers, Wideband Amplifiers, Integrated Circuit Building Blocks.

BMM 310 Practical Training 2

(0-0-0)

In this internship, it is expected to take part in tasks that require active participation such as hardware, design, production line work, calibration, quality testing, and to realize the importance of work integrity and to report experience gained properly. In addition, it is expected to observe works in engineering business. Duration of training is 20 working days.

BMM 312 Software Engineering

(3-0-3)

SE concepts, position of SE in the computer world, processes, models and methods, systems and requirements engineering, modeling, determination of usage scenarios, analysis, design, software architecture, detailed module design, the user frontend design, programming techniques, rapid application development techniques, incremental development/phased delivery, verification and validation, module, integration and system testing, test methods and techniques, project management, metrics, process shortcuts, the calendar setting, project follow up, risk and quality management, process termination and improvement, change management, version and distribution control, configuration management.

BMM 314 Biotechnology and Genetics (3-0-3)

Biotechnology course will gain information about cell engineering, tissue engineering, protein engineering, smart polymers, nanotechnology, artificial kidneys, artificial heart, liver support systems, bio-affinity chromatography, extracorporeal therapy, bio-chips, molecular imaging techniques, artificial skin and artificial blood, genome mapping, cloning, gene therapy, methods for transferring transgenes into target cells, scanning genes for mutation, the human genome, the sequence of the human genome, tools and methods for genetic technology.

BMM 316 Biopolymers (3-0-3)

Proteins, amino acids and amino acid sequences, purification and characterization of three-dimensional conformation, enzymes: mechanism, structure and regulation, polysaccharides, carbohydrates, lipids, lipoproteins and membranes, nucleotides, nucleic acids, vitamins, hormones.

SSP900 Social Responsibility Project (Free Elective) (1-2-2)

Development of social responsibility phenomenon, Discussions on the present evaluations and applications of social responsibility. Social responsibility project.

7th SEMESTER

BMM 401 Project Plan and Organization (2-0-2)

Identification, analysis and optimization of projects in biomedical industry. Flow sheet development and path synthesis, and related techniques. General principles of organization. Optimization of a biomedical process.

BMM 403 Quality Control and Management (2-0-2)

Introduction to ISO 9000-TS 9000 series of quality management. Total quality management. Productivity and quality concepts, productivity, quality and decision structures. Productivity and organization development. Principles of quality and productivity measurements.

BMM 405 Biomedical Instrumentation (3-0-3)

Biomedical Instrumentation course is introduction to basic concepts of instrumentation. after considering basic survey, standards and units, these issues will be held: electrodes and transducers, biomedical amplifiers, Electrocardiography, basic principles of physiological pressure measurement and Phonocardiography, measurement techniques related to the blood volume and blood flow, other cardiovascular measurements, life-support units: defibrillators, pacemakers, heart-lung pumps, systems used to measure brain parameters, measurements related to the respiratory system, respiratory therapy systems, intensive care and coronary care units, operating theaters and electro-surgical systems, clinical laboratory measurement systems, hemodialysis systems, electro-optics, medical ultrasonic systems.

BMM 407 Biomedical Instrumentation Laboratory (0-4-2)

Electromyography (EMG), Electroencephalography (EEG), Electrocardiography (ECG), ECG and sphygmus, Electrooculograph(EOG), Blood Pressure, Heart sounds, breath cycle, Reflex, Experiments in the context of spinal cord. Report preparation.

BMM 409 Cell Culture Techniques (3-0-3)

Primer cultures and cell lines, culture morphology, cryopreservation of cell lines, protocols.

BMM 411 Bioelectromagnetism (3-0-3)

Fundamental concepts, Vector analysis, Electricity sources and electromagnetic fields. Introduction to membrane biophysics. Action potentials. Volume sources and volume conductance fields. Human body as a volume conductor. Analysis methods of volume sources and volume conductors. Biomagnetic measures.

BMM 413 Biomedical Signal Processing (3-0-3)

Discrete time signals and systems, Z-transform, Discrete time fourier transform, More linear transforms, discrete time cosinus transform, discrete time sinus transform, Hartley, Hilbert, Walsh, Hadamart transforms, digital filters, Introduction to multi-signal-processing, Introduction to time-frequency domain, Properties of bioelectric (ECG, EEG, EMG, ERG, ENG) signals, signal levels, frequencies and processing. Basic parameters of Speech signals, Techniques for processing speech signals in PC, Image construction techniques, Determination of image processing techniques and algorithms based on the sources of image.

BMM 415 Physiological Control Systems (3-0-3)

Biological motor control, Feedback and Feedforward, Control of linear and nonlinear, Adaptive control and parameter estimation, Neural Networks for parameter estimation, Cardiovascular system and control of cardiac pacemakers. Temperature regulation.

BMM 417 Cell and Tissue Engineering (3-0-3)

Extracellular matrix analogs, ECM, synthetic polymers, natural polymers, cell functions, stem cells, cell attachment, cell-biomaterial interactions, cellular metabolism, tissue regeneration, mass transfer in cell and tissues, angiogenesis, drug release, inflammatory effect, tissue inductions (skin, nerve, blood vessel, ligament, bone, cartilage), gene therapy, tissue engineering products, patents and rules.

BMM 419 Biomedical System Design (3-0-3)

Basics of Human Physiology and modelling. Biopotential sources and classification. Design Principles of biomedical devices. Biomedical transducers and electrots. Biopotential amplifiers and signal processing. Measurements in Cardiovascular system. Clinical Laboratory devices. Biomedical imaging Systems. Prothesis and surgical devices. Biotelemetry. Usage of PC in biomedical topics. Electricity security in hospitals and biomedical devices. Influence of electromagnetic fields on Human health.

BMM 421 Biophysics (3-0-3)

Introduction to biophysics. Intracelluler electricity, Defination of radioactivity, Bioenergytics, Cell respiratory, Membrane potentials, Biological reactions and the molecular concepts of enzyme effect mechanism, respiratory biophysics, Circulation biophysics.

BMM 423 Introduction to Fuzzy Logic and Artificial Neural Networks (3-0-3)

Fuzzy sets, Membership functions, Fuzzy procedures, T-norm and S-norm procedures. Fuzzy rules. Fuzzification, defuzzification, fuzzy deduction. Applications of Mamdani fuzzy deduction. Sugeno fuzzy deduction and application example. Fuzzy Logic applications in MATLAB. Brain structure. Artificial neuron. Perceptron. Multilayer neural Networks. Learning. Backpropagation method. Momentum coefficient. Applications examples of ANN in Matlab.

BMM 425 Biosensors (3-0-3)

Definitions, Bioelectronic devices and transducers. Potansiometric (glass, liquid, solid state membrane, gaseous state sensitive electrodes), amperometric, optic, calorimetric and other transducer systems. Enzyme electrodes, substrate electrodes. Immune sensors and microbial sensors. Novel approaches.

BMM 427 Biomedical Robot Design (3-0-3)

Robotic and biomedical relationship. Robots according to coordinate systems, robots according to control systems. Dynamic properties of robots, forward-inverse kinematic analysis. The concept of forward and inverse kinematic analysis in robots. Denavit-Hartenberg (D-H) demonstration. Control elements and robot hand mechanisms in robotics and robot control. Robot programming and simulation. Creation of robot software development environment. Determination of robot working space and trajectory planning. Simulation of working space with robotic hand application. Medical robots and sensors. Highly sensitive biomedical robots and analysis. Nanorobot technology and nanorobotics in biomedical technologies.

8th SEMESTER

BMM 400 Graduation Project (0-6-3)

The independent study which is conducted under the supervision of a faculty member: The designing or implementation of the system, software or performing a specific function and/or analysing with the help of computer and/or theoretical approaches to the problem of an engineering, preparing of a project report which is approved by the supervisor and presented to the supervisor.

BMM 402 Entrepreneurship and Leadership (2-0-2)

The concept of entrepreneurship. Developing a business plan. Marketing and financial considerations in businesses. Small businesses and quality. Human resources management in small businesses. Basic approaches to leadership. Inspirational approaches to leaderships: Charismatic and Transformational leadership. Ethics and trust in leadership. Motivating team members. Helping team members to improve their performance. Substitutes and neutralizers to leadership. Cultural variation in leadership. Leadership and Entrepreneurship. Examples for entrepreneur milestones.

BMM 404 Occupational Health and Safety (2-0-2)

Introduction. Scope of the course and contents. Current regulations. Definition and causes of accident, chain of accident, prevention of accidents. Accident statistics and their evaluation. Professional diseases. Hazardous chemicals. Personal protection equipment (PPE).

BMM 406 Biomedical Polymer Technologies (3-0-3)

Polymeric materials used in biomedical field, production methods, cytotoxicity.

BMM 408 Neuroengineering (3-0-3)

Introduction, Concepts of neuronal anatomy, Neural Networks, Researchs in visual neuroscience, eye movements and instrumentation, ICA EEG local and vector populations, Neuroprosthetics, Imaging Part 1: Instrumentation. Imaging Part 2: Spatial coding, Functional MRI, Plasticity and Brain-computer interfaces.

BMM 410 Controlled Drug Release Systems (3-0-3)

Introduction. Fundamentals of polymer science. Classification of controlled release systems: Diffusion controlled membrane and matrix systems; chemicals controlled systems: solvent effective systems, Microcarriers. Bioadhesives, Transdermal systems, Implants. Ocular, oral, rectal and gynecological applications.

BMM 412 Bioinformatics (3-0-3)

Determination of problems for computational applications in Bioinformatics and solution algorithms, Bioinformatics databases, formats, search engines. Gene expression methods, Protein structures, properties, analysis and estimations. Filogenetic analysis. Analysis of Microarray datas. Mass spectrometre analysis. Visualising gene Networks. Pattern recognition and matching in arrays.

BMM 414 Ultrasonography Techniques and Applications (3-0-3)

Introduction to Ultrasonography, Fundamental physics principles of Ultrasonography, Properties of sound waves, Production of ultrasound, Piesoelectric phenomenon, Transducers, Sound-tissue interaction, Factors of image quality, Imaging methods in Ultrasonography.

BMM 416 Biomedical Optics (3-0-3)

Introduction to fundamental concepts on optics, General principles of light, beam, geometric and fiber optic Systems, lasers, weaving and refraction, tissue optics, biophotonic optics.

BMM 418 Artificial Organs and Life Support Systems (3-0-3)

Introduction to anatomy, respiratory system, gas law, respiratory mechanics, mechanic ventilation, ventilation devices, heart and circulation system, artificial blood, artificial liver, intraaortic baloon pump, heart support devices, artificial vessel prosthesis.

BMM 420 Data Mining (3-0-3)

Introduction to data mining, Definations of data mining, Background of data mining, Data mining techniques, Operations and algorithms, Data mining applications, Data mining problems, Text mining, Web mining, Examples.

BMM 422 Doppler Technique and Applications (3-0-3)

Introduction to Doppler Technique, Ultrasonography and Doppler ultrasonography, Doppler spectrum, Reflaction and absorbation of sound waves, Coding technology, A-Mod, B-Mod, M-Mod. Investigation of Arterial and Venus structures. Image construction from raw data.

BMM 424 Engineering Economy (2-0-2)

Introduction: The economical decision-making in engineering, engineering economics in industrial engineering. Basic Concepts: The basic concepts of engineering economics, investment evaluation criteria. Money And Time Value: cost and economical equivalent of Money, the calculation of interest rates. Interest Rate Calculations: Nominal and effective interest rates, extraction of interest formulas Using interest tables, investment evaluation techniques with the help of Excel tables. Features of the Investment Evaluation Techniques: Financial and non-financial investments, investment strategies. Investment Evaluation Techniques: Net present value analysis.

BMM 426 Medical Device Calibration (0-6-3)

Hospital quality standards, control of environmental conditions, calibration instructions, accreditation, guideline preparation, archiving, function test, measurement tools used in calibration, calibrators used in biomedical devices, test equipments used in biomedical devices, calibration media, calibrators and test devices, the impact of the measurement limit on the results, the process in case of value out of limits.