

**BIOMEDICAL DEVICE TECHNOLOGY
2024-2025 COURSE CONTENTS**

SEMESTER I

MYO006 INTRODUCTION TO BIOMEDICAL TECHNOLOGY (2+0), ECTS: 2

Development and history of Biomedical Device Technology, its relationship with other branches of science; working areas, duties and responsibilities of Biomedical Device Technician, coordination with Biomedical Engineer; biopotential signals and their formation; medical device transducers and electrodes, types and properties; human-instrumentation system. Giving basic information about the design, use and improvement of biomedical devices.

MAT101 BASIC MATHEMATICS (2+0), ECTS: 3

Numbers, Exponents, Rooted Numbers, Absolute Value, Factorization, Ratio Proportion, Equations, Equations of 1st order with 1 unknown, Equations of 1st order with 2 unknowns, Equations of 2nd order with 1 unknown, Inequalities, Inequality Systems, Functions, Sets

BCT109 DIRECT CURRENT CIRCUIT ANALYSIS (2+2), ECTS: 6

Basic laws, resistance and ohm's law, simple resistance circuits, series circuits, parallel circuits, series and parallel circuits, ideal and non-ideal sources, general resistance circuits with source conversion, circuit theorems, superposition, thevenin, norton and maximum power transfer theorems, triangle-star and star-triangle transformation, transients in capacitance and resistance-capacitor circuits, charging and discharging, energy storage in capacitor, faraday and lenz laws, transients in resistance-coil circuits, energy storage in inductance and discharge phase. Related experiments: investigation of parameters affecting conductor resistance, measurement of current and voltage in direct current, experiments on peripheral currents and nodal voltages in direct current, proof of thevenin's method in direct current by experiments, direct current series, parallel and mixed circuit experiments.

BCT113 ELECTRONICS COMPONENTS AND MEASURING TECHNIQUE (2+2), ECTS: 6

Basic Concepts. Basic and derived units, unit standards. Errors and static characteristics. DA measurements - Galvanometer with rotating coil, DC Ammeter, DC Voltmeter, Resistance measurements and ohmmeters. A.A measurements and concepts, Electrodynamic measuring instrument, electrostatic voltmeters, rotary magnet measuring instrument. Recognizing basic circuit elements. Power and energy measurement. Oscilloscope. Definition of occupational safety, work accidents and dangerous situations. The effect of electric current on human and fault current circuit.

MYO101 BASIC ANATOMY AND PHYSIOLOGY**(3+0), ECTS: 4**

Introduction to Anatomy and Physiology, Cell theory, Cell organelles, Substance exchange, Cell metabolism, Locomotor System Anatomy and Bone, joint and muscle Physiology, Respiratory System Anatomy and Physiology, Circulatory System Anatomy and Physiology, Digestive System, Urinary System, Genital System, Endocrine System, Nervous System, Sensory Organs Anatomy and Physiology.

RKUL103 UNIVERSITY CULTURE I**(0+2), ECTS: 4**

Each semester includes seminars, conferences, panels, workshops and talks to be held for 14 weeks within the framework of a program consisting of the proposals of academic units, student council and student clubs at the university.

TURK103 TURKISH LANGUAGE I**(2+0), ECTS: 2**

Language awareness, reading taste and habit, correct use of basic spelling and punctuation rules, a wider vocabulary.

INGU103 ENGLISH I**(2+0), ECTS: 2**

This course is designed for beginning learners of English and aims to develop basic language skills. It helps learners to acquire listening, reading and writing skills through different teaching techniques and practical exercises. Learners learn basic grammar patterns and vocabulary by using dialogues and texts in real-life situations. By the end of this course, learners are prepared to progress from beginner to intermediate-beginner level in English.

ATA103 PRINCIPLES OF ATATURK AND HISTORY OF REVOLUTIONS I (2+0), ECTS: 2

Basic Concepts, Causes of the Collapse of the Ottoman Empire, Turkish Innovation Movements, World War I, National Struggle.

SEMESTER II**BCT100 FAILURE ANALYSIS AND TROUBLESHOOTING****(2+2), ECTS: 6**

Finding the fault by various methods and troubleshooting the fault using the sequence of operations, checking the soundness of the circuit elements, reading the catalog information of semiconductors.

BCT116 ALTERNATIVE CURRENT CIRCUIT ANALYSIS**(2+2), ECTS: 6**

Obtaining Alternating Current, Alternating Current and Voltage calculations, Behavior of Circuit Elements in AA and Circuit Solution Methods, Power and Energy calculation in AA, Three-phase AA Systems

BCT118 RESEARCH METHODS AND TECHNIQUES IN BIOMEDICAL (2+0), ECTS: 2

Literature review and discussion, writing and presenting a project application form, discussing project contents in order to follow the innovations in the field of biomedicine, to conduct research and to apply for scientific student projects related to the field.

SBS110 VOCATIONAL MATHEMATICS (2+0), ECTS: 2

Basic Geometric Concepts I, Basic Geometric Concepts II, Equation and Inequality Systems I, Equation and Inequality Systems II, Polynomials. Matrices, Determinants, Functions, Linear functions and linear equations, Nonlinear functions and linear equations.

RKUL104 UNIVERSITY CULTURE II (0+2), ECTS: 4

Each semester includes seminars, conferences, panels, workshops and talks to be held for 14 weeks within the framework of a program consisting of the proposals of academic units, student council and student clubs at the university.

RPSI209 POSITIVE PSYCHOLOGY AND COMMUNICATION SKILLS (ÜSEÇ) (2+0), ECTS: 3

Definition of Positive Psychology, Basic Concepts, Theoretical Foundations and Applications. Socioemotional experience and behavior, examining brain-behavior systems studied within cognitive sciences. Recognition of self and others, Awareness and Empathy. Psychosocial Life Skills and Problem Solving Skills. Motivation and Planning. Anger, Aggression and Violence. Relationship Management and Healthy Decision Making. Persistence and Compromise.

TURK 104 TURKISH LANGUAGE II (2+0), ECTS:2

Language awareness, reading taste and habit, basic spelling and punctuation correct use of rules, a wider vocabulary.

INGU 104 ENGLISH II (2+0), ECTS: 2

This course is designed for beginning learners of English and aims to develop basic language skills. It helps learners to acquire listening, reading and writing skills through different teaching techniques and practical exercises. Learners learn basic grammar patterns and vocabulary by using dialogues and texts in real-life situations. By the end of this course, learners are prepared to progress from beginner to intermediate-beginner level in English.

ATA 104 PRINCIPLES OF ATATURK AND HISTORY OF REVOLUTIONS II (2+0), ECTS: 2

Events, ideas and principles in the process of birth and development of modern Turkey; Turkish Foreign Policy in Atatürk's Era, Atatürk's Revolutions, Atatürk's Principles.

SEMESTER III

BCT241 LIFE SUPPORT AND OPERATING ROOM DEVICES (2+0), ECTS: 5

Incubators, function and malfunctions, Ventilator, function, operation, electrical-electronic malfunctions, Nebulizer operation and malfunctions, Electroshock systems, operation and electrical malfunctions, Defibrillator and Pacemaker, operation and malfunctions, Heart lung pump operation and malfunctions, Operating table-patient bed malfunctions, Operation and malfunctions of electrocautery devices, Installation of operating room lamps, Operation and malfunctions of anesthesia device, Operation and malfunctions of aspirator device.

BCT245 MEDICAL ANALYSIS AND LABORATORY DEVICES (BSEÇ) (2+0), ECTS: 5

Introduction to Medical Analysis and Laboratory Equipments, Blood Gas Analyzers, Blood Counters, Spectrophotometers, Centrifuges, Autoanalyzers, Coagulometers, PCR devices, Microscopes, Separators and Mixers, Tissue tracking devices, Microtome devices, Cryostat devices, Storage Devices (cold/hot).

BCT243 PHYSIOLOGICAL SIGNAL VIEWERS (2+0), ECTS: 5

Introduction and working principles of ECG, EEG, EOG, ENMG, sleep disorder diagnosis, respiratory measurement systems, bedside signal monitors, audiometric monitors, NIBP (sphygmomanometer) and timponometry devices, which are physiological signal monitors, and troubleshooting possible electrical and mechanical malfunctions of these devices.

BCT239 MEDICAL IMAGING DEVICES (2+0), ECTS: 5

Medical Imaging Methods, Basic Imaging Principles, Intra-body imaging. X-ray, Radiation Concept, Traditional (conventional) Digital X-ray devices, Fluoroscopy, Mammography, CT, Ultrasonic imager (sound wave, physical properties of sound wave), working principles, parts of MR Devices. Nuclear Medicine (PET, SPECT) Mechanical structure, working principle, purpose, types and usage areas of medical monitors, cameras and video processors, electrical connection diagrams of devices, block diagrams, common malfunctions.

BCT237 DIGITAL ELECTRONICS (2+2), ECTS: 6

Number Systems, Boolean Algebra, Logic Gates, Logic Circuits, Multivibrators and Flip Flops

ILK101 FIRST AID (2+0), ECTS:3

General First Aid Information, Human Body, Patient / Injured and Crime Scene Assessment, Basic Life Support, Respiratory Tract Obstructions, Bleeding and Shock, Injuries, Burns, Freezing, Heat Stroke, Consciousness Disorders (Loss of Consciousness, Convulsions, Low Blood Sugar, Chest Pain), Poisoning, Animal Bites, Foreign Objects in the Eye-Ear-Nose, Drowning, Fractures, Dislocations, Sprains, Transportation Techniques.

SEMESTER IV

BCT200 TEST, CONTROL AND CALIBRATION OF MEDICAL DEVICES (2+0), ECTS: 4

ISO IEC 17025 deney ve kalibrasyon standartının şartlarının öğrenilmesi, Elektriksel sıcaklık ve basınç mimarilerini kavrayarak bu parametrelerde çalışan cihazların kalibrasyonunun yapılması, Test sonuçlarının raporlanması ve ölçüm belirsizliklerinin hesaplanması, Elektriksel Güvenlik kavramı ve ISO 60601 standartının gereklilikleri, 93/42/EEC tıbbi cihaz yönetmeliği.

BCT230 BIOLOGICAL HAZARDS IN MEDICAL DEVICES (2+0), ECTS:3

Safe Working with Medical Devices, Microbiological Risk Factors, Laboratory and Hospital Safety, Sterilization, Disinfection, Decontamination, Factors Causing Infectious Diseases, Transmission Routes of Infectious Diseases, Infectious Diseases, Occupational Diseases, Precautions, Prevention Routes, Biological, Chemical, Physical and Ergonomic Risk Factors and Protection in Hospitals, Emergency Aid in Chemical, Biological, Radiation and Nuclear (CBRN) Hazards

BCT214 ESTABLISHING QUALITY MANAGEMENT SYSTEMS ON MEDICAL DEVICES (2+0), ECTS: 3

General quality management Quality management applications ISO 22000 ISO 9001 ISO 13485 ISO 17025 ISO 17043 Calibration knowledge and document preparation will be explained in the course.

BCT224 MICROCONTROLLERS (BSEÇ) (2+2), ECTS: 6

Microcontroller Architecture and Hardware, Programmers and Microcontroller program loading, Algorithm Design, Flow Diagrams, Memory Structures and Microcontroller memory and registers, Microcontroller memory and registers, Microcontroller program commands, Basic input and output programs, Program compilation and error checking, Button and led applications with microcontroller, 7 segment display applications with microcontroller, Keypad applications with microcontroller

BCT226 HOSPITAL ORGANISATION (2+0), ECTS: 4

Definition of Management, Historical Development and Functions, Characteristics, Classification and Functions of Health Services, Development and Organization of Health Services in Turkey, Hospital Management, Health, Characteristics of Health Service, Health system in Turkey

BCT999 SUMMER INTERNSHIP (0+20 WORKING DAY), ECTS: 9

During the summer semester for 20 working days, field applications of the theoretical knowledge acquired during the year.

ELECTIVE COURSE

(2+0), ECTS: 2