

Description of GBE 302 BIOMEDICAL INSTRUMENTATION

Course Name: BIOMEDICAL INSTRUMENTATION

Course Code: GBE 302

Type of Course: Lecture

Level of Course: Undergraduate (First Cycle)

Year of Study: 3

Semester/Trimester: Spring

ECTS Credits: 5

FU Credits: 3

Name(s) of Lecturer(s): Nizamettin AYDIN (naydin@yildiz.edu.tr)

Course Coordinator: Nizamettin AYDIN

Objectives of the Course: Electrical basis of biological systems and modeling and processing signals

Course Description: This course will cover various systems of the human physiology, signals of biological origin obtained from these systems, biosensors, transducers, bioelectrodes used to acquire such signals, and amplifiers for measuring biopotentials. Electrical safety of medical devices; measurements of the blood pressure, blood flow, respiratory system, clinical laboratory equipment, medical imaging, and bioethics will also be discussed. The main objective of this course is to introduce student to basic biomedical engineering technology. As a result student can understand, design and evaluate systems and devices that can measure, test and/or acquire biological information from the human body.

Learning Outcomes: -

Mode of Delivery: Face-to-Face

Prerequisites: None

Co-requisites: None

Course Contents: **Week Topics**
(Weekly Lecture Plan)

- 1 Introduction and motivation
Why do we study biomedical engineering, basic measurement and physiological concepts.
- 2 The origin of biopotentials, electrical activity of excitable cells, action potentials, membrane models.
- 3 The origin of biopotentials: ECG, EMG, EEG, MEG, etc.
- 4 Biopotential electrodes and amplifiers.
- 5 Measurement of blood flow and pressure.
- 6 Cardiovascular system, hemodynamics.
- 7 Respiratory system, measurements of the respiratory system.
- 8 Measurement of blood pressure.
- 9 Processing of biological signals.
- 10 Clinical laboratory systems.
- 11 Biocontrol
- 12 Electrical safety.
- 13 Contemporary topics.
- 14 Contemporary topics.

Recommended Reading: Introduction to Biomedical Engineering, Enderle, Academic Press.
 Introduction to Biomedical Engineering, Domach, Pearson.
 Introduction to Biomedical Instrumentation: The Technology of Patient Care, Christie, Cambridge University Press.
 Biomedical Engineering: Bridging Medicine and Technology, Saltzman, Cambridge University Press.
 Medical Instrumentation: Application and Design, Webster, Wiley.
 Bioinstrumentation, Enderle, Morgan and Claypool Publishers.
 Bioinstrumentation, Webster, Wiley.
 Principles of Bioinstrumentation , Normann, Wiley.
 Biomedical Instrumentation: Technology and Applications, Khandpur, Mc Graw Hill.
 Introduction to Biomedical Equipment Tech., Carr and Brown, Prentice Hall.
 Std. Handbook of Biomedical Engineering & Design, Kutz, Mc Graw Hill.
 Design of Medical Electronic Devices, Perez, Academic Press.
 Introduction to Bioengineering, Goldsmith and Lewis, Oxford.
 Principles of Anatomy and Physiology, Tortora and Grabowski, Wiley.
 Engineering Physiology, Kroemer, Springer
 Design and development of medical electronic instrumentation: a practical perspective of the design, construction, and test of material devices, Prutchi and Norris, Wiley.

**Planned Learning
 Activities and Teaching**

Methods: Lectures, Presentation

Assessment Methods:

Method	Quantity (%)	
Attendance& participation	-	05
Quiz	-	10
Homework	-	10
Presentation	1	10
Midterm Exam(s)	2	30
Final Exam	1	35

Language of Instruction: English

Work Placement(s): N/A

Attendance Policy: The requirement for attendance is 70%. (*Hospital reports are not accepted to fulfill the requirement for attendance. The students, who fail to fulfill the attendance requirement, will be excluded from the final exams and the grade of NA will be given*).