

Biomedical Instrumentation

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Course Details

- Course Code : GBE 302
- Course Name: Biomedical Instrumentation
- Instructor : Nizamettin AYDIN

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Assesment

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

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- Systems of the human physiology,
- Signals of biological origin obtained from these systems,
- Biosensors, transducers, bioelectrodes used to acquire such signals,
- Amplifiers for measuring biopotentials.
- Electrical safety of medical devices;
- Measurements of the blood pressure, blood flow, respiratory system,
- Clinical laboratory equipment,
- Medical imaging,
- Bioethics

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Objective

- 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.

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Specific learning outcomes

- Briefly describe the basics of human physiology and biology.
- Perform quantitative measurement and analysis of typical biosignals
- Describe the operational details of various medical monitoring and data collection devices
- Describe and synthesize the computational process of various contemporary medical devices.

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Some Recommended books

- 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.

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Some Recommended books

- 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.

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Course Outline

- 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.

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Rules of the Conduct

- No eating /drinking in class
– *except water*
- Cell phones must be kept outside of class or switched-off during class
– *If your cell-phone rings during class or you use it in any way, you will be asked to leave and counted as unexcused absent.*
- No web surfing and/or unrelated use of computers,
– *when computers are used in class or lab.*

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Rules of the Conduct

- You are responsible for checking the class web page often for announcements.
- Academic dishonesty and cheating will not be tolerated and will be dealt with according to university rules and regulations
– *Presenting any work, or a portion thereof, that does not belong to you is considered academic dishonesty.*

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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.*

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