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| Course Unit Title | Biomedical Electronics | |
| Course Unit Code | BME310 | |
| Type of Course Unit | Compulsory | |
| Level of Course Unit | 3 rd year BSc program | |
| National Credits | 3 | |
| Number of ECTS Credits Allocated | 5 | |
| Theoretical (hour/week) | 4 | |
| Practice (hour/week) | - | |
| Laboratory (hour/week) | 2 | |
| Year of Study | 3 | |
| Semester when the course unit is delivered | 5 | |
| Course Coordinator | Fatih Veysel Nurçin | |
| Name of Lecturer (s) | Fatih Veysel Nurçin | |
| Name of Assistant (s) | Fatma Zor / Niyazi Şentürk | |
| Mode of Delivery | Face to Face. | |
| Language of Instruction | English | |
| Prerequisites | EE208 | |
| Recommended Optional Programme Components | | |
| Course description: This course is designed for biomedical engineering undergraduate students. The purpose of this course is provide biomedical instrumentation background on technical aspects. | | |
| Objectives of the Course: | | |
| <ul style="list-style-type: none"> The goal of the course is to provide students with an in-depth knowledge and understanding of the principles of electronic circuits with a particular emphasis on solving design problems involving commonly encountered in biomedical electronics. The specific course objectives are to review the fundamentals of electronic circuit design, to expose to students to problem-oriented design, to expose the students to problems particular to biomedical electronics circuits, to integrate the physiological concepts with electronic design and to prepare the students for solving design problems in any area of biomedical engineering. | | |
| Learning Outcomes | | |
| At the end of the course the student should be able to | | Assessment |
| 1 | Develop a thorough understanding on basics of some electrochemical properties of human body | 1,2 |
| 2 | Develop a thorough understanding on basics of some biomedical measurements | 1, 4 |
| 3 | Develop a thorough understanding on basics of some medical electronics system logic | 1, 2, 3, 4 |
| 4 | Develop a thorough understanding on basics of clinical applications of some medical electronic devices | 1, 2, 3 |
| Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Lab. Work | | |
| Course's Contribution to Program | | |
| | | CL |
| 1 | Apply knowledge of mathematics, natural science with relevant to life science | 4 |

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| | and multidisciplinary context of engineering science. | |
| 2 | Analyse, design and conduct experiments, as well as to analyse and interpret data. | 4 |
| 3 | Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability. | 4 |
| 4 | Function on multidisciplinary teams. | 3 |
| 5 | Control in design work, by using simulation, modelling and tests and integration in a problem solving oriented way. | 3 |
| 6 | Display an understanding of professional and ethical responsibility. | 3 |
| 7 | Communicate effectively aware of the non-technical effects of engineering. | 2 |
| 8 | Search technical literature and other information sources. | 1 |
| 9 | Recognize of the need for, and an ability to engage in life-long learning. | 1 |
| 10 | Exhibit a knowledge of contemporary issues. | 2 |
| 11 | Use the techniques, skills and modern engineering tools necessary for engineering practice to develop marketable products for the global market. | 4 |

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

| Week | Chapter | Topics | Assessment |
|------|---------|--|-----------------------------------|
| 1 | | Semiconductors | |
| 2 | | Clippers, Clampers, Rectifiers | 1 st Homework Assigned |
| 3 | | Applications of Semiconductor Diodes in the field of Biomedical Devices | |
| 4 | | Bipolar Junction Transistors, Biasing of Transistors | 1 st Homework due |
| 5 | | CE, CB, CC Configurations, Field Effect Transistors | 2 nd Homework Assigned |
| 6 | | Applications of BJT and FET in the field of Biomedical Devices | 2 nd Homework due. |
| 7 | | | Midterm Exam |
| 8 | | Operational amplifiers | 3 rd Homework Assigned |
| 9 | | Design and Applications of various types OP-AMP | |
| 10 | | Application of Operational Amplifiers in the field of Biomedical Devices | |
| 11 | | Combinational Amplifier Circuits | 3 rd Homework due. |
| 12 | | Combinational Amplifier Circuits | 4 th Homework Assigned |
| 13 | | BJT, FET, MOS networks and low noise amplifier circuits which used at the input of EEG, ECG, EMG instruments in the medical field applications | |
| 14 | | Revision | 4 th Homework due. |
| 15 | | | Final Exam. |

Recommended Sources

Textbook:

- Robert L. Boylestad & Louis Nashelsky “Electronic Devices and Circuit Theory”, 11th Edition, ISBN: 978-0132622264
- C. Raja Rao, Sujoy K. Ghua, Principles of Medical Electronics and Biomedical Instrumentation
- Joseph Dubovy, Biomedical Electronics

Assessment

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|--------------|------|--|
| Attendance | 5% | Less than 25% class attendance results in NA grade |
| Project | 5% | |
| Midterm Exam | 25% | Written Exam |
| Lab works | 15% | |
| Homeworks | 10% | |
| Final Exam | 40% | Written Exam |
| Total | 100% | |

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Late assignments will not be accepted unless an agreement is reached with the lecturer.
3. Students may use calculators during the exam.
4. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

| Activities | Number | Duration (hour) | Total Workload(hour) |
|---|--------|-----------------|----------------------|
| Course duration in class (including Exam weeks) | 15 | 4 | 60 |
| Labs and Tutorials | 8 | 3 | 24 |
| Assignment | 4 | 2 | 8 |
| Project/Presentation/Report | - | - | - |
| E-learning activities | - | - | - |
| Quizzes | - | - | - |
| Midterm Examination | 1 | 6 | 6 |
| Final Examination | 1 | 12 | 12 |
| Self-Study | 15 | 4 | 60 |
| Total Workload | | | 180 |

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| Total Workload/30(h) | 6.00 |
| ECTS Credit of the Course | 6.00 |