

## SYLLABUS

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| <b>General information</b>                     | <b>Title and code of subject, number of credits</b>   | ETR 393 Basics of Circuitry 6 ECTS                                   |                    |
|  | <b>Department</b>   | Physics and Electronics  |                    |
|  | <b>Program</b>  | Bachelor   |                    |
|  | <b>Academic semester</b>  | 2022 Fall  |                    |
|  | <b>Lecturer</b>   | MSc, MIET, Alim Huseynov   |                    |
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|  | <b>Phone number:</b>  | +994 55 425 3599   |                    |
|  | <b>Lecture room/Schedule</b>  | 11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room |                    |
| <b>Course language</b>                         | English   |  |                    |
| <b>Type of the subject</b>                     | Major   |  |                    |
| <b>Prerequisites</b>                           | MATH 101 – Mathematics I  |  |                    |
| <b>Textbooks and additional materials</b>      | Textbooks:<br>1. Electronic Principles - Albert Malvino, David Bates<br>2. Electronics Fundamentals. Circuits, Devices, and Applications by David M. Buchla, Thomas L. Floyd<br>3. Electronic devices and circuit theory by Boylestad, Robert Nashelsky, Louis  |  |                    |
| <b>Teaching methods</b>                        | <b>Lecture</b>  |  | x                  |
|  | <b>Group discussions</b>  |  | x                  |
| <b>Assessment</b>                              | <b>Components</b>   | <b>Date/ Deadline</b>  | <b>Percent (%)</b> |
|  | <b>Quizzes</b>  | During the semester  | 10                 |
|  | <b>Activity</b>   | At each lesson   | 5                  |
|  | <b>Project</b>  |  | 15                 |
|  | <b>Midterm exam</b>   |  | 30                 |
|  | <b>Final exam</b>   |  | 40                 |
|  | <b>Final</b>  |  | <b>100</b>         |
| <b>Course description</b>                      | The course discusses the basic methods for calculating the steady-state and transient processes in electrical circuits, their application to the most common electronic engineering circuits, including amplifiers, rectifiers, stabilizers, triggers and other devices. Much attention is paid to the properties and characteristics of semiconductor elements: diodes, bipolar and field effect transistors, thyristors, operational amplifiers, and the simplest logic elements. Separate chapters are devoted to circuitry of digital devices, including DAC and ADC. A set of test and individual tasks will allow you to master the practical skills of designing and calculating electronic circuits necessary for professional activities.  |  |                    |
| <b>Course objectives</b>                       | The course is devoted to the study of the basic laws of electrical engineering, methods for analyzing electrical circuits and circuitry implementations of electronic devices designed to convert analog, pulse and digital signals. The theoretical knowledge and practical skills of designing digital devices acquired during training provide the basis for further acquaintance with existing approaches to the design of computing devices.   |  |                    |
| <b>Learning outcomes</b>                       | After completing the course, the student not only gets an idea of the basics of designing digital devices, but also masters the design skills of such devices using the most advanced computer-aided design tools. Practical study of the discipline is implemented using the modern element base of programmable logic circuits.   |  |                    |
| <b>Rules (Educational policy and behavior)</b> | <u>Lesson organization</u><br>General information on the subject will be provided for the students during lectures. Student's knowledge on the previous topics will be evaluated and new topic will be explained by means of visual aids during seminars. Student's knowledge level will be tested orally and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory.<br><u>Attendance</u><br>Participation of students at all classes is important. Students should inform dean's office about missing lessons for particular reasons (illness, family issues and etc.). Students, missing more than 25% of lessons, are not allowed to take the exam.<br><u>Tests</u><br>Those students who have informed the teacher and the dean's office about missing the test in advance |  |                    |

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|  | <p>for particular reasons, are allowed to take the test next week.</p> <p><u>Exams</u><br/>All the issues related to the participation and admission to the exam are regulated by the faculty dean. Topics of midterm and final exams are provided for the students before the exams. The questions of midterm exam are not repeated in the final exam.</p> <p><u>Violation of the rules of the exams</u><br/>Disrupting the test and taking copy during midterm and final exams is forbidden. Test papers of the student who do not follow these rules are canceled and the students are expelled from the test by getting 0 (zero).</p> <p><u>The rule for completing the course</u><br/>In accordance with the University rules the overall success rate to complete the course should be 60% or above. The students who failed the exam would be to take this subject next semester or next year.</p> <p><u>Rules of conduct for Students</u><br/>Disruption of the lesson and not following ethical norms during the lesson, as well as conduction of the discussions by the students without permission and using mobile phones is forbidden.</p> <p><b>Quizzes</b><br/>There will be a quiz during the semester. The quizzes will be announced in the classroom two weeks before and will relate to homework. Each quiz will be evaluated out of 5 points</p> <p><b>Project</b><br/>At the end of the semester and students must assemble a circuit that reflects the operation of electronic devices.</p> <ul style="list-style-type: none"> <li>• <b>Activity</b><br/>Students who will be active during discussion of past lessons will be awarded with one activity mark.</li> </ul> |
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This program reflects the comprehensive information about the subject and information about any changes will be provided in advance.

| Week | Subject topics   | Textbooks / Assignments                                  |
|------|--|--|
| 1.   | Introduction to Electronics and Circuit Components.    | [1] p2<br>[2] p1   |
|      | Conduction of oral and written survey. Problem solving |  |
| 2.   | Semiconductors, Diode Theory, Diode Circuits           | [1] p28, p56, p86<br>[2] p703<br>[3] p1, p57             |
|      | Conduction of oral and written survey. Problem solving |  |
| 3.   | Special-Purpose Diodes                                 | [1] p140   |
|      | Conduction of oral and written survey. Problem solving |  |
| 4.   | BJT Fundamentals, BJT Biasing                          | [1] p188, p240<br>[2] p768<br>[3] p133, p166             |
|      | Conduction of oral and written survey. Problem solving |  |
| 5.   | Basic BJT Amplifiers                                   | [1] p280   |
|      | Quiz 1 - Lecture 1 – Lecture 4                         |  |
| 6.   | Multistage, CC, and CB Amplifiers                      | [1] p326   |
|      | Conduction of oral and written survey. Problem solving |  |
| 7.   | Power amplifiers, JFETs, MOSFET, Thyristors            | [1] p366<br>[3] p705<br>[1] p414, p470, p524<br>[p] p387 |

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|     | Quiz 2 - Lecture 5 – Lecture 6  |                            |
| 8.  | Mid term exam.  |                            |
| 9.  | Frequency Effects   | [1] p568                   |
|     | Conduction of oral and written survey. Problem solving                                  |                            |
| 10. | Differential Amplifiers   | [1] p624                   |
|     | Conduction of oral and written survey. Problem solving                                  |                            |
| 11. | Operational Amplifiers  | [1] p666<br>[3] p625       |
|     | Quiz 3 - Lecture 7 – Lecture 10   |                            |
| 12. | Negative Feedback   | [1] p710<br>[3] p775       |
|     | Conduction of oral and written survey. Problem solving                                  |                            |
| 13. | Linear Op-Amp Circuit Applications, Active filters                                      | [1] p740, p788             |
|     | Conduction of oral and written survey. Problem solving                                  |                            |
| 14. | Nonlinear Op- Amp Circuit Applications, Oscillators                                     | [1] p850, p902<br>[3] p775 |
|     | Quiz 4 - Lecture 11 – Lecture 13  |                            |
| 15. | Regulated Power Supplies  | [1] p958<br>[3] p705       |
|     | Solving problems and ambiguities of students about the course<br>Solving extra examples |                            |