

## SYLLABUS

<b>General information</b>	<b>Title and code of subject, number of credits</b>	ETR 575- Automated design of electronic devices- 8 ECTS credits	
	<b>Department</b>	Physics and Electronics	
	<b>Program</b>	Bachelor	
	<b>Academic semester</b>	2023 Spring	
	<b>Lecturer</b>	PhD, Assistant Professor Elchin Hasanov	
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	<b>Lecture room/Schedule</b>	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	<b>Consultations</b>	II, 15:00 – 16:00	
	<b>Office hours</b>	Sunday 10-00	
<b>Prerequisites</b>	EENG 245		
<b>Course language</b>	English		
<b>Type of the subject</b>	Major		
<b>Textbooks and additional materials</b>	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Kazantsev Yu.M., Chertov A.S. Design of electronic devices in the environment of software packages "PSPICE", "POLUCE". Teaching aid. - Tomsk: TPU publishing house, 2000-102s.</li> <li>2. Kazantsev Yu.M. Guidelines for the preparation of initial data for the database of the PSPICE circuit design software package. Method. directions to conducting a lab. slave. Ed. TPU, 1995. - 13s.</li> <li>3. Kazantsev Yu.M. Operating manual for the circuit software package design "PSPICE" Method. instructions for the lab. slave. Ed. TPU, 1995. - 23s.</li> <li>4. Kazantsev Yu.M. Calculation of typical circuits and components of converter technology devices. Method. instructions for the lab. slave. Ed. TPU, 1995. - 44s.</li> <li>5. Kazantsev Yu.M. Methods and programs for machine calculation of elements and units of VIP. Method. instructions for the lab. slave. Ed. TPU, 1995. - 75s. Logistics of discipline</li> </ol>		
<b>Teaching methods</b>	<b>Lecture</b>		+
	<b>Group discussions at seminars</b>		+
<b>Assessment</b>	<b>Components</b>	<b>Date/ Deadline</b>	<b>Percent (%)</b>
	<b>Tests</b>	During the semester	5
	<b>Active participation</b>	At each lesson	10
	<b>Quizzes</b>	During the semester	15
	<b>Attendance</b>	During the semester	5
	<b>Midterm exam</b>		30
	<b>Final exam</b>		35
	<b>Final</b>		<b>100</b>
<b>Course description</b>	<ul style="list-style-type: none"> <li>. - Quality indicators of output parameters of electronic devices.</li> <li>- Design of power electronics devices</li> <li>- Algorithms for designing and optimizing circuits of DC converters voltage, inverters and rectifiers</li> <li>- Automated synthesis of control systems for electronic devices</li> </ul>		

	<p>- Design analysis of electromagnetic compatibility</p> <p>- Study of the circuit, measurement of the electrical modes of the elements, determination integral values of output characteristics</p> <p>- Development and approval of the program for the study of the circuit on the model. Analysis and agreement on the results of the design of the scheme</p>
<b>Course objectives</b>	<p>The purpose of the discipline is:</p> <p>Goal 1. In the field of education - to acquaint students with typical software products focused on solving scientific, design and technological problems of electronics, to teach the principles and methods of calculation, design and construction of components, devices and electronic devices based on a systematic approach, including the stages of a circuit, design and technological design, the requirements for standardization of technical documentation, teach how to apply methods and computer systems for the design and study of devices and devices of electronic equipment.</p> <p>Goal 2. In the field of education - to teach how to work effectively individually and in a team, to demonstrate the skills necessary for professional and personal development;</p> <p>Goal 3. In the field of development - preparing students for the further development of new professional knowledge and skills, self-study, continuous professional self-improvement</p>
<b>Learning outcomes</b>	<p>As a result of mastering the discipline, the student must:</p> <p>Know the terms and definitions of the design process, the basic principles and methods of organizing CAD, basic modeling methods,</p> <p>Be able to evaluate the integral parameters of the device and the electrical modes of circuit elements, develop a program and methodology for testing electronic devices on the developed models.</p> <p>Own methods and algorithms for designing electronic devices based on standard design procedures, methods for analyzing design results, skills in working with special literature.</p> <p>In the process of mastering the discipline, students develop the following competencies:</p> <p>1. general cultural -</p> <p>the ability to adapt to changing conditions, to overestimate the accumulated experience, analyze their capabilities</p> <p>2 General professional -</p> <p>the ability to use the results of mastering the disciplines of the master's program the ability to independently acquire and use in practice new knowledge and skills in their subject area</p> <p>3. Professional -</p>

	<p>- research activities:</p> <p>the ability to develop effective algorithms for solving formulated problems using modern programming languages and ensure their software implementation</p> <p>- design and development activities:</p>
<b>Rules (Educational policy and behavior)</b>	<ul style="list-style-type: none"> <li>▪ <b>Preparation for the lesson.</b> This course makes your study and preparation outside of the classroom essential. Lectures are based on what is presented in the text. A visual explanation will greatly help your understanding of the lecture. After the lecture, you should study your notes and work through the relevant tasks and cases from the end of the chapter and the sample exam questions.</li> <li>• <b>Withdrawal (pass/fail)</b> This course strictly follows grading policy of the School of Humanities, Education and Social sciences. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.</li> <li>▪ <b>Cheating/plagiarism</b> Plagiarism or epigonism during midterm and final exams will result in the cancellation of the work. In this case, the student automatically gets zero (0), without any reasoning..</li> <li>▪ <b>Rules of professional conduct</b> Students must behave appropriately for the university in order to create an appropriate aura during their studies. Unauthorized discussions and unethical behavior are strictly prohibited.</li> <li><b>Attendance</b> Students who attend the whole classes will get 5 marks. for three absence student loses 1 mark.</li> <li>• <b>Quizzes</b> There will be a quizzes per two weeks. The quizzes will be announced in the classroom two weeks before and will relate to homework.</li> <li>• <b>Activity</b> Students who will be active during discussion of past lessons will be awarded with one activity mark.</li> </ul>

This program reflects the comprehensive information about the subject and information about any changes will be provided in advance.

<b>Week</b>	<b>Dates (planned)</b>	<b>Subject topics</b>	<b>Textbook/ Assignments</b>
<i>1</i>	<i>18. 02. 23</i>	Computer-Aided Design Methodology  Basic concepts and principles of computer-aided design	[1] p.709-741
<i>2</i>	<i>25.02/23</i>	Modeling of electronic devices  The content aspect of the design process. Stages and stages of creating new technology, design procedures and operations. Block-hierarchical approach to design. Hierarchy of system structures  Problem solving..	[1] p.750-773  [1] p-780-795

3	04/03/23	Design of power electronics devices; Diagnostic and control tests, principles of their generation when using computer-aided design systems	[1] p.800-815
		Problem solving.	
4	11/03/23	Design of devices of low-current electronics Basic software products, solutions of design problems in electronic engineering.	[1] p.815-838
		Problem solving.	
5	18/03/23	.Construction and technological design and reliability assurance Systems Modeling. Terms and Definitions. Types of modeling. The main tasks to be solved at the modeling stages	
		Problem solving.	
6	25/03/23	Methods for computer-aided design of secondary power sources Models of circuit components and principles of their formation in circuit modeling systems	[1] p.846-872
		Problem solving.	
7	01/04. 23	Power electronic systems of autonomous objects Functional-logical design of digital units of electronic circuits. Asynchronous and synchronous modeling. Signal and Element Models	[1]p.881-900,
		Problem solving	
8	08/04/23	Machine methods of analysis and design of electronic circuits. Functional design. Basic elements of functional circuits and algorithms for their modeling.	[1] p.957-984
		Problem solving.	
		<b>Mid term exam</b>	
09	15/04/23	Development of terms of reference and technical proposals for the design of radio electronic devices	[1] p.916-947
		Problem solving	

<b>10</b>	<b>22/04/23</b>	Building mathematical models of analog electronic circuits in the frequency and time domain	[4]p. 73-96
		Problem solving	
<b>11</b>	<b>29/04/23</b>	Construction of mathematical models of assembly-switching spaces of structures in the form of graphs	[1] p.1061-1085
		Problem solving	
<b>12</b>	<b>06/05. 23</b>	Building a model of electronic means using modern applied tools for computer-aided design	[3]p.555-611
		Problem solving.	
<b>13</b>	<b>13/05. 23</b>	Construction of a formalized model of a part for the synthesis of the technological process of its manufacture.	[1] page 9-6
		. Problem solving	[1] page 10-6
<b>14</b>	<b>20. 05/23</b>	Automated synthesis of control systems for electronic devices Diagnostic and control tests, principles of their generation when using computer-aided design systems	[1] page 11-6
<b>15</b>	<b>27.05.23</b>	Closing the feedback loop, verifying the model Design and technological design and ensuring the reliability of the developed equipment	[1] page 14-21

