

## SYLLABUS

<b>General information</b>	<b>Title and code of subject, number of credits</b>	ETR466 Electrical Power Supply 6 ECTS	
	<b>Department</b>	Physics and Electronics	
	<b>Program</b>	Bachelor	
	<b>Academic semester</b>	2022 fall	
	<b>Lecturer</b>	Associate Professor, Ph.D Sevda N. Garibova	
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	<b>Phone number:</b>		
	<b>Lecture room/Schedule</b>	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room Lectures:	
	<b>Consultations</b>	Saturday 12-00 -13-20	
<b>Prerequisites</b>	EENG 245		
<b>Course language</b>	English		
<b>Type of the subject</b>	Major		
<b>Textbooks</b>	<p><i>Textbooks:</i></p> <ol style="list-style-type: none"> <li>Keith Billings, Taylor Morey. Switchmode power supply, London 2011.</li> <li>V.Ramanarayanan. Course on material on Switched mode power conversion. Indian Institute of science.2008. E-book pdf</li> </ol> <p><i>Web pages:</i></p> <p><a href="https://www.electrical4u.com/electrical-engineering-articles/power-electronics/#">https://www.electrical4u.com/electrical-engineering-articles/power-electronics/#</a></p> <p><a href="https://www.bharathuniv.ac.in/page_images/pdf/courseware_eee/Notes/sem5/SEM%20V%20BEE%20502POWER%20ELECTRONICS.pdf">https://www.bharathuniv.ac.in/page_images/pdf/courseware_eee/Notes/sem5/SEM%20V%20BEE%20502POWER%20ELECTRONICS.pdf</a></p>		
<b>Teaching methods</b>	<b>Lecture</b>	15	
	<b>Group discussions at seminars</b>	15	
<b>Assessment</b>	<b>Components</b>	<b>Date/ Deadline</b>	<b>Percent (%)</b>
	<b>Tests</b>		
	<b>Active participation, oral questions and discussion</b>	At each lesson	10
	<b>Assignment and quizzes</b>	2 quizzes during the semester	10
	<b>Presentation work</b>		10
	<b>Midterm exam</b>		30
	<b>Final exam</b>		40
	<b>Final</b>		<b>100</b>
<b>Course description</b>	<p>This course of Electrical Power Supply as one of the branches of Power Electronics widely reveals the basic component used in energy conversion from a source to the voltage, current, and frequency to the load. The fact that these components supplies power to the load makes it possible to consider them secondary energy sources. This course studies in detail the main classification and types of power supplies, such as converters, SMPS, linear power supply, regulated power supply, high voltage and bipolar power supply. Electrical Power supplies are the fundamental component of many electronic devices and therefore have a wide range of applications, examples of which are the computer, electric vehicle, welding, aircraft, automation, medical and other.</p>		
<b>Course objectives</b>	<p>The course of Electrical Power Supply includes the process of conversion of electric current from a source to the correct voltage, current, and frequency to the load. Therefore, the student should be known how the electronic component supplies electric energy to the load. The end of course the students understand how to power supply are developed, will examine the main types of power supplies such as switched mode supply, ac power supply, regulated power supply. The students will study the work principle, advantages and application of programmable and computer power supply, ac and dc power supply, regulated power supply, uninterruptible power supply. The students will be knowing the main physical processes in power supply, will be able to analyze the basic power supply circuit, their switching characteristics and block diagram.</p>		

<b>Learning outcomes</b>	What students should know by the end of the course: power supplies, types of power supplies, converters, switchmode power supply, uninterruptible power supply, programmable and computer power supply, flyback converter, controller, functions of converters and their applications as power supply, Faraday screen, AC converter, inrush control, bipolar power supply, power supply circuit.
<b>Rules (Educational policy and behavior)</b>	<ul style="list-style-type: none"> <li>• <b>Presentation work</b> Prepare presentation work on the topics given by the teacher during the semester</li> <li>• <b>Lesson organization</b> 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 mins of visual aids during seminars. Student's knowledge level will be tested orally and in written forms (quizzes) before midterm and final exams. Submission of the individual works by the end of course is obligatory.</li> <li>• <b>Exams (pass/fail)</b> 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. 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. Students who got 57% can retake the exam.</li> <li>• <b>Violation of the rules of the exams</b> 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).</li> <li>• <b>Rules of conduct for Students</b> 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.</li> <li>• <b>Attendance</b> 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. Students who attend the whole classes will get 5 marks. For three absences student loses 1 mark.</li> <li>• <b>Quizzes</b> There will be quizzes per two weeks. The quizzes will be announced in the classroom two weeks before and will relate to homework. Depending on the difficulty of the lesson, quizzes can be two or three times during the semester, each with three or five points.</li> <li>• <b>Activity</b> For activity during lessons in the whole semester, students are rewarded with 5 points. The activity of students is assessed by the preparation of home questions, which is given by the teacher after the lessons; it can also be oral discussions.</li> </ul>

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<b>Week</b>	<b>Dates (planned)</b>	<b>Subject topics</b>	<b>Textbook/ Assignments</b>
<b>1</b>	15.09  17.09	<i>Introduction to electrical power supply, various types of power supplies, main classification, application, power diode, converters</i>  <b>Oral questions and discussing</b>	[2] chapter 1 <a href="https://www.watelectrical.com/what-is-a-power-supply-and-types-of-power-supply-for-electrical-circuits/">https://www.watelectrical.com/what-is-a-power-supply-and-types-of-power-supply-for-electrical-circuits/</a>
<b>2</b>	22.09 24.09	<i>Power switching devices characteristics: ideal switches, real switches, practical power switching devices. Power supply circuit. Uninterruptible Power Supply</i> <b>Discussing and testing</b>	<a href="http://www.electrical4u.com/">http://www.electrical4u.com/</a>
<b>3</b>	29.09  01.10	<i>Functions and requirements common to most direct –off-line switchmode power supplies. AC and DC power supply</i>  <b>Oral questions and discussing</b>	[1] chapter 1 p.1.3
<b>4</b>	06.10 08.10	<i>AC powerline surge protection . Regulated power supply, varistors</i> <b>Testing and discussing</b>	[1] chapter 2 p.1.17
<b>5</b>	13.10	<i>MOSFET , Gate turn-off thyristor</i>	<a href="http://www.electr">http://www.electr</a>

	15.10	<b>Testing</b>	<a href="http://www.electrical4u.com/">ical4u.com/</a>
<b>6</b>	20.10 22.10	<i>Faraday screens as applied to switching devices. IGBT - insulated gate bipolar transistor</i> <b>Testing and discussing</b>	[1] chapter 4 p. 1.43
<b>7</b>	27.10 29.10	<b>Converters:</b> converters, primitive converter, DC converter, isolated and non-isolated converter  <b>Quizze 1</b>	<a href="http://www.electrical4u.com/">http://www.electrical4u.com/</a>
<b>8</b>	03.11 05.11	<i>Line rectification and capacitor input filters for direct –off-line switchmode power supplies. Linear power supply</i>  <b>Mid term exam</b>	[1] chapter 6 p.1.55
<b>9</b>	10.11 12.11	<i>Inrush control. Inrush current in power supply. New current-limiting technique</i>  <b>Activity testing</b>	[1] chapter 7 p.1.73 <a href="https://www.electronicproducts.com/Electromechanical_Components/Understanding_power_supplies_and_inrush_current.aspx">https://www.electronicproducts.com/Electromechanical_Components/Understanding_power_supplies_and_inrush_current.aspx</a>
<b>10</b>	17.11 19.11	<i>Triac:construction and operation. Dual converter</i>  <b>Presentation work</b>	<a href="https://www.bharathuniv.ac.in/page_images/pdf/courseware_eee/Notes/sem5/SEM%20V%20BEE%20502POWER%20ELECTRONICS.pdf">https://www.bharathuniv.ac.in/page_images/pdf/courseware_eee/Notes/sem5/SEM%20V%20BEE%20502POWER%20ELECTRONICS.pdf</a>
<b>11</b>	24.11 26.11	<b>Control , drive and protection of power switching devices:</b> base drive circuits, requirements of base drive, drive circuits. Copper or DC to DC.  <b>Presentation work</b>	[2] chapter 3 p.69-80 <a href="https://www.electrical4u.com/chopper-dc-to-dc-converter/">https://www.electrical4u.com/chopper-dc-to-dc-converter/</a>
<b>12</b>	01.12 03.12	<b>Controller basics:</b> DC to DC controller, buck and boost converter, DC –to –DC converter dynamics, idealized DC-DC converter, generalized state space model of converter.  <b>Quizze 2</b>	[2] chapter 5 p.135, 159-160 p.208-212
<b>13</b>	08.12 10.12	<i>Overvoltage and overload protection. Types and methods of over protection</i>  <b>Testing for activity point</b>	[1] chapter 11, 13 p.1.107 <a href="https://www.sunpower-uk.com/glossary/what-is-over-voltage-protection/">https://www.sunpower-uk.com/glossary/what-is-over-voltage-protection/</a>
<b>14</b>	15.12 17.12	<i>Flyback transformer design, flyback converter.</i>  <b>Presentation work</b>	[1] part 2, chapter 2 , p.2.53 <a href="https://www.sunpower-uk.com/glossary/what-is-a-flyback-">https://www.sunpower-uk.com/glossary/what-is-a-flyback-</a>

			<a href="#">converter/</a>
<b>15</b>	22.12	<i>AC chopper, cycloconverter and voltage controller.</i>	<a href="https://www.teamwavelength.com/power-supply-basics/">https://www.teamwavelength.com/power-supply-basics/</a>
	24.12	<b><i>Testing for activity point and prepare to final exam</i></b>	
		<b><i>Final Exam</i></b>	

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