

SYLLABUS

General information	Title and code of subject, number of credits	ETR466 Electrical Power Supply 6 ECTS credits	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2023 fall	
	Lecturer	Associate Professor, Ph.D Sevda N. Garibova	
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	Phone number:		
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room Lectures:	
	Consultations	Saturday 12-00 -13-20	
Prerequisites	EENG 245		
Course language	English		
Type of the subject	Major		
Textbooks	<p><i>Textbooks:</i></p> <ol style="list-style-type: none"> Keith Billings, Taylor Morey. Switchmode power supply, London 2011. V.Ramanarayanan. Course on material on Switched mode power conversion. Indian Institute of science.2008. E-book pdf <p><i>Web pages:</i></p> <p>https://www.electrical4u.com/electrical-engineering-articles/power-electronics/#</p> <p>https://www.bharathuniv.ac.in/page_images/pdf/courseware_eee/Notes/sem5/SEM%20V%20BEE%20502POWER%20ELECTRONICS.pdf</p>		
Teaching methods	Lecture	+	
	Group discussions at seminars	+	
Assessment	Components	Date/ Deadline	Percent (%)
	Tests		
	Active participation, oral questions and discussion	At each lesson	5 point for participation 5 point for activity
	Assignment and quizzes	2 quizzes during the semester Each 5 point	10
	Presentation work (with practical work results)	Prepare presentation work on the topics given by the teacher during the semester	10
	Midterm exam		30
	Final exam		40
	Final		100
Course description	<p>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. 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 supply power to the load makes it possible to consider them secondary energy sources. Every Electronic circuit is assumed to operate off some supply voltage which is usually assumed to be constant. Power electronic circuit that maintains a constant output voltage irrespective of change in load current or line voltage is called voltage regulator. With the increase in circuit complexity and improved technology a more severe requirement for accurate and fast regulation is desired. This has led to need for newer and more reliable design of dc-dc converters. This course studies in detail the main classification and types of power supplies, such as converters, Switch Mode Power Supply, linear power supply, regulated power supply, high voltage, and bipolar power supply.</p>		
Course objectives	<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</p>		

	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.
Learning outcomes	<p>They should know:</p> <ul style="list-style-type: none"> • Classification, main features and parameters of electric power devices; • Elements of electrical power sources; • Transistor converters; • Protection schemes in transistor stabilizers; • Voltage and current stabilizers • Converters or inverters that convert constant voltage to variable voltage. <p>They should be able to:</p> <ul style="list-style-type: none"> • To know the working principle of constant and alternating current energy supplies and to apply them in practice; • Freely build schemes of energy sources based on the subject of electrical power plants; • To develop improvement and creativity when developing electronic circuits; • Measuring the parameters of details using measuring devices; • Organization of remote feeding of accumulators.
Rules (Educational policy and behavior)	<ul style="list-style-type: none"> • Lesson organization 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, with practical works and in written forms (quizzes) before midterm and final exams. Submission of the individual works by the end of course is obligatory. • Exams (pass/fail) 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. • Violation of the rules of the exams 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). • Rules of conduct for Students 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. • Attendance 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. • Quizzes 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. • Activity 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.

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

Week	Dates (planned)	Subject topics	Textbook/ Assignments
1	19.09	Introduction to electrical power supply, various types of power supplies, main classification, application, power diode, converters	[2] chapter 1 p.1-10 https://www.watele

	21.09	Oral questions and discussing	ctrical.com/what-is-a-power-supply-and-types-of-power-supply-for-electrical-circuits/
2	26.09 28.09	<i>Power switching devices characteristics: ideal switches, real switches, practical power switching devices. Power supply circuit. Uninterruptible Power Supply</i> Discussing and testing	[2] chapter 1 p. 5-10
3	03. 10 05.10	<i>Direct –off-line switchmode power supplies. Basic operation of Direct –off-line SMPS. Thyristors</i> Oral questions and discussing	[1] chapter 1 p.1.3 https://www.electrical4u.com/wo-transistor-model-of-scr/
4	10.10 12.10	<i>AC powerline surge protection . Regulated power supply, varistors</i> Testing and discussing, practical work in laboratory	[1] chapter 2 p.1.17
5	17.10 19.10	<i>Reactive components in power electronics system</i> Testing and discussing	[2] chapter p.47-60
6	24.10 26.10	<i>Faraday screens as applied to switching devices</i> Practical work in laboratory	[1] chapter 4 p. 1.43
7	31.10 02.11	Converters: converters, primitive converter, DC converter, isolated and non-isolated converter. Quizze 1	http://www.electrical4u.com/
8	07.11 14.11	<i>Line rectification and capacitor input filters for direct –off-line switchmode power supplies. Linear power supply</i> Mid term exam	[1] chapter 6 p.1.55
9	16.11 21.11	<i>IGBT - insulated gate bipolar transistor</i> Activity testing and practical work in laboratory	[2] chapter 1, p. 26-30 https://www.electrical4u.com/insulated-gate-bipolar-transistor-igbt/
10	23.11 28.11	<i>Triac: construction and operation.</i> Presentation work	https://www.electrical4u.com/electrical-engineering-articles/power-electronics/#
11	30.11 05.12	<i>Inrush control. Inrush current in power supply. New current-limiting technique</i> Presentation work	[2] chapter 3 p.69-80, chapter 4, p. 95-98
12	07.12 12.12	Control , drive and protection of power switching devices: base drive circuits, requirements of base drive, drive circuits. Copper or DC to DC. Quizze 2	[2] chapter 3 p.69-80 https://www.electrical4u.com/copper-dc-to-dc-converter/
13	14.12 19.12	Controller basics: DC to DC controller, buck and boost converter, DC –to –DC converter dynamics, idealized DC-DC converter, generalized state space model of converter. Testing for activity point with practical work in laboratory	[2] chapter 5 p.135, 159-160 p.208-212 https://www.electrical4u.com/buck-converter-step-down-chopper/

14	21.12	<i>Overvoltage and overload protection. Types and methods of over protection</i>	[1] chapter 11, 13 p.1.107 https://www.sunpower-uk.com/glossary/what-is-over-voltage-protection/
	23.12	<i>Presentation work</i>	
15	26.12	<i>Flyback transformer design, flyback converter</i>	https://www.sunpower-uk.com/glossary/what-is-a-flyback-converter/
	28.12	<i>Testing for activity point and prepare to final exam</i>	
		<i>Final Exam</i>	

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