

Identification	Subject	ETR 480-Electrotechnology, 6 ECTS credit
	Department	Physics and Electronics
	Program (Undergraduate, Graduate)	Undergraduate
	Term	Fall 2026
	Instructor	Nijat Hajiyevev
	Email:	hajiyevnijat@gmail.com
	Classroom/hours	11 Mehseti str. (Neftchilar campus), Monday and Friday, 08:30-18:40
Prerequisites	None	
Language	English	
Compulsory/Elective	Compulsory	
Textbooks and course materials	Textbooks: 1. Bird, John. <i>Electrical and Electronic Principles and Technology</i>. 2nd ed., Newnes, 2007. 2. Beaty, H. W., & Fink, D. G. (2021). <i>Standard Handbook for Electrical Engineers</i> (17th ed.). McGraw-Hill Education. 3. Chapman, S. J. (2022). <i>Electric Machinery Fundamentals</i> (5th/latest ed.). McGraw-Hill. 4. Whitaker, J. C. (2021). <i>The Electronics Handbook</i> (3rd ed.). CRC Press. 5. Lund, H. (2024). <i>Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of Fully Decarbonized Societies</i> (3rd ed.). Elsevier. 6. Nelson, V. C., & Starcher, K. L. (2026). <i>Introduction to Renewable Energy</i> (3rd ed.). CRC Press. 7. Nelson, V., & Starcher, K. (2026). <i>Wind Energy: Renewable Energy and the Environment</i> (4th ed.). CRC Press.	
Course description	This course introduces the fundamental principles of electrical and electronic engineering, bridging core circuit theory with practical technological applications. Students explore direct and alternating current circuit theorems, electromagnetism, single-phase and three-phase AC systems, and semiconductor components. The curriculum emphasizes analytical problem-solving techniques for electrical networks, measuring instruments, and operational parameters of electronic systems.	
Course objectives	1. Master the foundational laws of electrical circuits, magnetic fields, and electromagnetic induction. 2. Apply analytical methods to evaluate DC and AC networks, transformers, and basic semiconductor devices. 3. Understand the operational principles of electrical measuring instruments and testing methods. 4. Comprehend the generation, transmission, and practical utilization of single-phase and three-phase alternating current power.	
Learning Outcomes	1. Calculate voltage, current, resistance, power, and magnetic flux using fundamental circuit laws and network theorems.	

	2. Analyze the transient and steady-state behavior of single-phase and three-phase AC circuits, including resonance and power factor correction. 3. Evaluate the performance characteristics of transformers, DC machines, and AC motors under various load conditions. 4. Interpret the behavior of basic semiconductor diodes and transistors within electronic rectifier and amplifier circuits.		
Teaching methods	Lecture		☒
	Classroom exercises		☒
	Laboratory projects		☒
	Quiz		☒
	Taking notes on a copybook		☒
	Homework exercises		☒
Evaluation Criteria	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	TBA	30
	Quiz	After the midterm	5
	Homework	At each lesson	5
	Final Project	After the midterm	15
	Activity	At each lesson	5
	Final Exam	TBA	40
	Total		100
Class Policy	▪ Preparation for class The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. You must have a copybook and take notes at each lesson. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions. Also, you must explore additionally and try to make circuits on your own after the lessons. Before using the laboratory at additional times, please inform faculty or department staff. • Withdrawal (pass/fail) This course strictly follows grading policy of the School of Science and Engineering. 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. • Cheating/plagiarism Cheating or other plagiarism during the Quiz, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations. • Professional behavior guidelines The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. • Quiz There will be a quiz after the midterm. The quiz will be announced in the classroom two weeks before and will relate to homeworks. Students will get maximum 5 marks in a quiz.		

	• Activity Students who will be active during classroom exercises, laboratory tasks and answering questions in the classroom will get 5 marks at each lesson. All students marks will be recorded in teacher's personal copybook and average mark will be calculated according to all marks at the end of semester. • Final project Students should make a circuit on the breadboard, calculate and measure all parameters. When they get proper results they should note all measured parameters and the circuit on their copybook. Final project should be prepared during out of lessons. But students can ask any questions to the teacher with email or whatsapp. Final project can be made by a student or a group. Maximum 3 students can be grouped. The final project topic will be chosen by students or teacher during the semester. • Homework Homework will be issued in lectures and collected a week later in recitation. You are welcome and encouraged to discuss the homework among your colleagues. However, the final formulation and write up of your homework answers must be your own. More importantly, although homework counts for only 5 percent of the grade, they are critical to learning the material and to doing well on the quizzes and final exam. • Rulings on using Generative AI Within this course, artificial intelligence tools can be used to support the learning process, brainstorm ideas, structure data, and assist with language editing. However, the core content, scientific analysis, and results of assignments must be independently prepared by the student. The use of AI tools is strictly prohibited during quiz, midterm and final exams. Students who use AI must appropriately cite its usage. Students must design, draw, and perform the calculations for circuits entirely by themselves. However, they are permitted to use AI for assistance with tasks such as calculating resistor color codes or looking up IC/transistor pinouts. The main rule is to use AI strictly as an auxiliary helper.
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Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook/Assignments
1		Units associated with basic electrical quantities	pp.3
2		An introduction to electric circuits	pp.9
3		Series and parallel networks	pp.39
4		Capacitors and capacitance	pp.52
5		Magnetic circuits	pp.68
6		Electromagnetism	pp.82
7		Electrical measuring instruments and measurements	pp.104
		Midterm exam	
8		Semiconductor diodes	pp.127
9		Transistors	pp.136
10		D.C. circuit theory	pp.157
11		Quiz	
12		Single-phase series a.c. circuits	pp.198

13		Three-phase systems	pp.287
14		Transformers	pp.303
15		Final Project	
		Final exam	

