General information	**Title and code of subject, number of credits**	ETR 487 - Electromagnetic Theory- 6 ECTS credit	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2021 spring	
	Lecturer	PhD, Assosiate Professor Shahmardan Amirov	
	E-mail:	phys_med@mail.ru	
	Phone number:		
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room Lectures:	
	Consultations		
Course language	English		
Prerequisites	ETR 346 – Telecommunication Networks		
Type of the subject	Major		
Textbooks and additional materials	***Textbooks*:** [1] Bo Thide Electromagnetic field Theory 2012, 298 p [2] David J.Griffith İntroduction to Electrodynamics 1999		
Teaching methods	**Lecture**		x
	Group discussions		x
Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Presentation/Group Discussion	At the end of the semester	10
	Active participation and discussion	At each lesson	5
	Assignment and quizzes	3 quizzes during the semester	10
	Attendance		5
	Midterm exam		30
	Final exam		40
	Final		**100**
Course outline	Communication system, signals, analog and digital communications, noise of DSB, SSB, FM, AM, entropy, block codes, cyclic codes, detection of signals, the prediction and filtering of random processes, the design and analysis of communication systems, the analysis of protocols for communication networks, and statistical processing of images.		
Course objectives	In the course of electrical communication theory students will study the fundamental theory of communication system. Also, they will analyze the structure of common communication system and can build the model of that system, will study both theoretical and practical aspects of information processing. At the end of the course the students understand how build the communication system, and why digital communication has wide uses in modern life. They will be able to construct the mathematical model and block diagrams of communication system, to analyze the input and output signals which have important roles for information communication.		
Learning outcomes	What students should know by the end of the course: Describe a suitable model for noise in communications, determine the signal-to-noise ratio (SNR) performance of analog communications systems, determine the probability of error for digital communications systems, understand information theory and its significance in determining		

	system performance, compare the performance of various communications systems.
Rules (Educational policy and behavior)	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 mins of visual aids during seminars. Student's knowledge level will be tested oraly and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory. Attendance Participation of students at all classis 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. Lates Those students who are late for lessons for more than 15 minutes are not allowed to participate at the lesson. Despite this, the student is allowed to take part in the second part of the lesson. Tests Those students who have informed the teacher and the dean's office about missing the test in advance for particular reasons, are allowed to take the test next week. Exams 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. 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). The rule for completing the course 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. 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.

Tentative Schedule

Week	Dates (planned)	Subject topics	Textbook/ Assignments
1	*09.02* *11.02*	Foundations of classical electrodynamics. Electric charge its properties. Coulomb"s law. Electrostatic field.	[1] Pages/ 1-7/
2	*16.02* *18.02*	Gauss's Law. Flux of uniform Electric field Field of a point charge. Field of a line of charge. Field between oppositely charged parallel plates. Charge on conductors. Field outside of spherical shell. Field inside uniform sphere of charge.	[1] Pages /11-23/
3	*22.02* *25.02*	Magnetostatics. The magnetostatics fields. Magnetic field due to current length element. Magnetic field due to a current in a long straight wire. Magnetic field due to a current in a circular Arc of wire	[2] pages /15-19/, [1] pages /196/
4	*02.03* *04.03*	Ampere's law. Magnetic field outside a long straight wire with current. Magnetic field inside a long straight wire with	[2] pages /19-21/

		current. Magnetic field of a solenoid.	
5	***09.03*** ***11.03***	Production of EM waves. Equation of a plane Electromagnetic wave. Pressure of EM waves. Umov-Poyinting vector. Maxwell's displacement current. Ampere's generalized law.	[2] pages /21-23/
6	***16.03*** ***18.03***	Faradey's law of induction. Electrostatic scalr potential. The magnetostatic vector potential. The electrodynamic potentials.	[1] pages /204- 205/, [2] pages /58/
7	***25.03*** ***30.03***	Electromagnetic waves in conductors. Frequency dependence of permittivity. Wave guides	[2] pages /135/
8	***06.04*** ***08.04***	***Midterm exam***	[2] pages /142/
9	***13.04*** ***15.04***	TE waves in rectangular wave guide. Coaxial transmission line.	[2] pages /24-26/, [1] pages /209/
10	***20.04*** ***22.04***	Scalar and vector potentials. Lienard-Wichert potentials.	[1] pages /218-220/
11	***27.04*** ***29.04***	Radiation of electric dipole. Electromagnetic field far from the system of charges. Dipole approximation. Wave zone.	[2] pages /23-34/
12	***04.05*** ***06.05***	Four dimensional current density .Law of conservation of charge. Continuity equation. Lagranje function for EM field and charge system. Four dimensional Gauss law	[2] pages /632/
13	***11.05*** ***13.05***	Magnetic dipole moment of moving charge system. Magnetic dipole in magnetic field. Force on magnetic dipole Mutual interaction of two magnetic dipole.	[1] pages /234-236/
14	***18.05*** ***20.05***	Magnetic Diople Radiation. Radiation from arbitrary source.	[1] pages /237-240/
15	***25.05*** ***27.05***	Special theory of relativity. The relativity of simultaneity. Time dilation. Twin paradox. Lorentz conraction. Lorentz transformations. ***Discussing final exam material*** ***Preparing to final exam***	
		Final Exam