

General information	Title and code of subject, number of credits	EENG245 Telecommunication systems 4 credits/8 ECTS	
	Department	Physics and Electronics	
	Program	Master	
	Academic semester	2022 spring	
	Lecturer	Associate Prof Guliyev Mazahim	
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	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations	Saturday 13:00 – 14:00	
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Telecommunication Switching Systems and Networks, PHI 2003 2. William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital SystemsI, Second Edition, TataMcGraw Hill Edition ,2006. 3. Telecommunication Systems Engineering, R. L. Freeman, 4/e, Wiley publication, 2010 		
Teaching methods	Lecture	15	
	Group discussions at seminars	15	
Assessment	Components	Date/ Deadline	Percent (%)
	Active participation	At each lesson	5
	Quizzes	During the semester	20
	Attendance		5
	Midterm exam		30
	Final exam		40
	Final		100
Course description	The purpose of this course is to teach students the modern telecommunication systems and its application in the industry. To understand the role of telecommunication systems in the building the Industry 4.0 information infrastructure		
Course objectives	The Understanding main principles of signal processing in telecommunication transmission, • describing principles of the modern digital telecommunications, • implementing acquired knowledge in professional specialist courses (theoretical and practical), • understanding c operation settings for telecommunication systems and equipment		
Learning outcomes	<ol style="list-style-type: none"> 1. explain physical and technical principles of modern digital telecommunications, 2. describe main principles of operation in modern digital telecommunication equipment and systems, 3. demonstrate measurements and experiments in laboratory on actual components, devices, equipment and systems in telecommunications, 4. describe development and implementation methods of telecommunication systems, 5. examine communication equipment for the technical functionality. 		
Rules (Educational policy and behavior)	<p>Lesson organization</p> <p>General information on the subject will be provided for the students during lectures.</p> <p>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 before midterm and final exams. Submission of the individual works by the end of course is obligatory.</p> <p>Attendance</p> <p>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.</p> <p>Lates</p> <p>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.</p> <p>Quizzes</p>		

	<p>Those students who have informed the teacher and the dean’s office about missing the quiz in advance for particular reasons, are allowed to take the quiz next week.</p> <p>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.</p> <p>Violation of the rules of the exams Disrupting the quiz and taking copy during midterm and final exams is forbidden. Quiz papers of the student who do not follow these rules are canceled and the students are expelled from the quiz by getting 0 (zero).</p> <p>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.</p> <p>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.</p>
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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		<i>Introduction:</i> Evolution of telecommunications . Simple telephone communication . Switching systems. Strouffer switching system, crossbar switching	[2] p. 2-16
2		<i>Introduction(Cont):</i> Major telecommunication networks. Electronic Space Division Switching . Stored program control . Centralized SPC, distributed SPC	[1] p. 4-20 [1] p.30-52 [1] p. 24-28 [1] p. 67-81
3		<i>Time Division Switchings and CDM:</i> Time Division Switching . Time multiplexed space switching . time multiplexed time switching . combination Switching . three stage combination switching . n-stage combination switching	[2] p. 31-57 [2] p. 76-85
4		<i>Time Division Switching(Cont):</i> Traffic Engineering: Network traffic load and parameters . grade of service and blocking probability . modeling switching systems, . incoming traffic and service time characterization. blocking models and loss estimates . delay systems. incoming traffic and service time characterization. blocking models and loss estimates . delay systems.	[2] p. 113-146 [2] p. 153-155
5		<i>Data networks and digital communication.</i> Data networks, Block diagram, features, working of EPABX systems . data transmission in PSTNs . modems, switching techniques for data transmission circuit switching, store and forward switching data communication architecture Digital radio modulations. Amplitude Modulation (AM), Frequency Modulation (FM), Binary Phase Shift Keying (BPSK), Quaternary Phase Shift Keying (QPSK), Gaussian Minimum Shift Keying (GMSK), OFDM (DMT – used in ADSL over twisted pair), adaptive orthogonal modulation. Asynchronous Transfer Mode (ATM), adaptable and flexible multiplexing. OSI model. IT networks, Ethernet (IEEE 802.3, 801.11, 802.16), LAN, MAN, WAN. Terms: HUB, Bridge, Router, MAC address, IP address.	[1] p. 216-240 [3] p. 124-148
		<i>Quiz 1(Lec1-Lec4)</i>	[1] p. 242-251
6		<i>Public holiday</i>	
7		<i>Data networks.</i> ISO-OSI reference model, link to link layers, physical layer, data link layer, network layer, end to end layers, transport layer, session layer, presentation layer, Satellite based data networks . LAN, metropolitan area network, fiber optic networks, and data network standards.	[2] p. 173-198 [2] p. 201-208 [2] p. 201-208

8		<i>Telephone Networks.</i> Telephone Networks: Subscriber loop systems, switching hierarchy and routing, transmission plan, Transmission systems, numbering plan, charging plan, Quiz 2(Lec5-Lec6)	[2] p. 271-300 [2] p. 310-314
9		Mid term exam	
10		. PSTN and NGN in Telecommunication Models of telecommunications system. Telecommunication networks: the topology of telecommunications networks, hierarchies, numbering, routing, tunneling, channel and packet switching. Central and access network. Next generation network NGN, migration of existing telecommunications networks to NGN. Migration paths. The most existing telecommunications networks; PSTN switching, switching elements, switching exchange AXE - 10 structures. Signaling networks and network transmission customer service as logically separate subnet. N - ISDN upgrade to AXE commutations BRA, PRA. The migration of PSTN and ISDN to NGN. W - ISDN, broadband access networks as NGN. IP / MPLS core network. Physical and transmission level ATM network (ATM, adaptable and flexible multiplexing.) and Ethernet (GbEthernet, 10GbEthernet, Fast Ethernet	[2] p. 384-422 [2] p. 425-427
11		<i>Integrated Services Digital Networks</i> Integrated Services Digital Networks: Motivation for ISDN new services, network and protocol	[2] p. 565-588 [2] p. 596-600
12		<i>Transport network in Telecommunication and optical and satellite systems</i> Synchronous and asynchronous, static and dynamic time division multiplexing. Plesiochronous digital hierarchy, primary group, secondary group, groups of higher levels. Synchronous digital hierarchy. Multiplexing PDH signals into SDH STM-1 transport module. Transmission media. Optical fibres: single mode, multimode. Optical cables. Wavelength division multiplexing (WDM): Dense wavelength division multiplexing (DWDM) and Coarse wavelength. Satellite systems	[2] p. 602-635 [2] p. 667-693 [2] p. 636-638 [2] p. 694-698
13		<i>Telecommunication network organization</i> Network management, Network services, various networking plans, types of networks, Routing plan, International numbering plan, National numbering plan, Numbering plan in Azerbaijan	[2] p. 764-788 [2] p. 801-805
14		<i>Overview of VOIP, IP switching and Multimedia IP systems and the role telecommunication industry in Industry 4.0</i>	[2] p. 807-825
15		Recap of all covered material Quiz 4(Lec11-Lec13)	
		Final Exam	

