## SYLLABUS

General	Title and code of subject,	ETR 640- Optical communication En	gineering - 8 ECTS credits			
information	number of credits					
	Department	Physics and Electronics				
	Program	Master				
	Academic semester	2021 Fall				
	Lecturer	Doctor of philosophy (PhD), associate p	professor, Farman Mammadov			
	E-mail:	<u>farman.mammadov@khazar.org</u>				
		<u>fnovruzoglu@yahoo.com</u>				
	Phone number:	(+994 12) 421-10-93				
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerb	oaijan (Neftchilar campus)			
		room				
	Classes start time	Monday, at 19:50 to 21:00				
Course language	English					
Type of the	Elective					
subject						
Textbooks and	1. John M. Senior assisted	d by M. Yousif Jamro, Optical Fiber Con	nmunications Principles and			
additional	Practice, Third edition	, 2009.	I I I I I I I I I I I I I I I I I I I			
materials	2. Djordjevic, Ivan B, Ad	lvanced Optical and Wireless Communi	ications Systems, 2018			
		1	5			
	3. <i>Govind P. Agrawal</i> . Fi	ber optic communication systems, 2002				
	4. Harry J. R. Dutton. Un	iderstanding Optical Communications, In	iternational Technical Support			
	Organization, 2000					
	5. Mrs.Anitha Patiband	lla, Associate Professor Mr.M.Ananth	ha Guptha, Assistant			
	Professor Ms.M.Nag	gma, Assistant Professor. FIBER OPT	TICAL			
	COMMUNICATION	NS/2019-20				
	Course website					
	https://eceagmr.files.w	ordpress.com/2014/09/optical-fiber-com	munications-principles-			
	and-pr.pdf					
	https://www.springer	https://www.springer.com/us/book/9783319631509				
	www.McGraw-Hill.ru					
	www.McGraw-Hill.ru					
	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf	nloads/digital_notes/ECE/III%20Year/Fl	IBER%200PTICAL%20COM			
Teaching	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf	nloads/digital_notes/ECE/III%20Year/Fl	BER%20OPTICAL%20COM			
Teaching	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminar	nloads/digital_notes/ECE/III%20Year/Fl	BER%20OPTICAL%20COM + +			
Teaching methods Assessment	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminar Components	nloads/digital_notes/ECE/III%20Year/Fl s Date/ Deadline	BER%20OPTICAL%20COM + + Percent (%)			
Teaching methods Assessment	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminary Components Ouiz	nloads/digital_notes/ECE/III%20Year/Fl s Date/ Deadline During the semester	BER%20OPTICAL%20COM + + Percent (%) 10			
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Teaching methods Assessment	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminary Components Quiz Active participation Presentations Midterm exam Final exam	nloads/digital_notes/ECE/III%20Year/Fl s Date/ Deadline During the semester At each lesson During the semester	BER%200PTICAL%20COM + + Percent (%) 10 5 15 25 40			
Teaching methods Assessment	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminars Quiz Active participation Presentations Midterm exam Final exam Total	nloads/digital_notes/ECE/III%20Year/Fl s Date/ Deadline During the semester At each lesson During the semester	BER%20OPTICAL%20COM + + Percent (%) 10 5 15 25 40 100			
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Teaching methods         Assessment         Course description         Course objectives	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminar: Components Quiz Active participation Presentations Midterm exam Final exam Total This course contains the fundan communication technics are usi networks, because the informati systems. It includes advantages transmission characteristics of co optical detectors, and optical an networks, in the nets distributio means of different mechanisms theory of multimode and single- including manufacturing, cablin contains the various schemes ar Optical communications engine community. Therefore an educa The course is essential in order	Import S           S           At each lesson           During the semester           At each lesson           During the semester           At each lesson           During the semester           Import of optical communications of optical topics of optical communications of optical fiber communication, types of optical fibers, optical sources: the laser, the optical fibers, optical sources: the laser, the optical fibers. The fiber optic techniques apply n systems, in the medicine etc. Simulation will be integral part of this course. We we mode fibers. Next, we have to learn the optic and components used in the fiber optic systeming is one of the essential and fast grow attor of this topic has a tremendous interest to understand the examples of optical communication.	BER%20OPTICAL%20COM + Percent (%) 10 5 15 25 40 100 engineering. Nowadays optical es in telecommunication gher than in other cable optical fiber cables, he light-emitting diode (LEDs), y now in the computer on of optical communication by vill learn in the first section the technological features, e second section of our course tems. wing fields in the engineering est for undergraduate students. mmunications theory of			
Teaching         methods         Assessment         Course         description         Course         objectives	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminar: Components Quiz Active participation Presentations Midterm exam Final exam Total This course contains the fundan communication technics are usi networks, because the informati systems. It includes advantages transmission characteristics of co optical detectors, and optical an networks, in the nets distributio means of different mechanisms theory of multimode and single- including manufacturing, cablin contains the various schemes ar Optical communications engine community. Therefore an educa The course is essential in order multimode and single-mode fib	Initial notes/ECE/III%20Year/F           s           Date/ Deadline           During the semester           At each lesson           During the semester           At each lesson           During the semester           At each lesson           During the semester           Image: Comparison of the semester           Image: Components us	BER%20OPTICAL%20COM + Percent (%) 10 5 15 25 40 100 engineering. Nowadays optical es in telecommunication gher than in other cable optical fiber cables, he light-emitting diode (LEDs), y now in the computer on of optical communication by vill learn in the first section the technological features, e second section of our course tems. wing fields in the engineering est for undergraduate students. mmunications theory of			
Teaching         methods         Assessment         Course         description         Course         objectives	www.McGraw-Hill.ru https://mrcet.com/dow MUNICATIONS.pdf Lecture Group discussions at seminar Components Quiz Active participation Presentations Midterm exam Final exam Total This course contains the fundan communication technics are usi networks, because the informati systems. It includes advantages transmission characteristics of co optical detectors, and optical an networks, in the nets distributio means of different mechanisms theory of multimode and single- including manufacturing, cablin contains the various schemes ar Optical communications engine community. Therefore an educa The course is essential in order multimode and single-mode fib The different generations of the	Initial notes/ECE/III%20Year/F           s           Date/ Deadline           During the semester           At each lesson           During the semester           At each lesson           During the semester           Image: At each lesson           Image: At each lesson <thimage: at="" each="" lesson<="" th=""></thimage:>	Here         +         Percent (%)         10         5         15         25         40         100         engineering. Nowadays optical         es in telecommunication         gher than in other cable         optical fiber cables,         he light-emitting diode (LEDs),         y now in the computer         on of optical communication by         vill learn in the first section the         technological features,         e second section of our course         tems.         wing fields in the engineering         est for undergraduate students.         mmunications theory of         explained, and applications			
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	to optical networks and fiber optic sensors, also the most recent developments in switched networks,					
		high bit-rate systems, and the radio over fiber are detailed.				
		The course covers the concepts of optical fiber communications, and optical networks.				
Learni	ng	What students should know at the end of this course:				
outcom	ies	The main materials of the course are the lectures. An important aspect of the lecture	res on the Optical			
		communication is that it uses real and computer physical experiments, educational films, and model				
		computer programs. Theoretical materials of the course require sophisticated mathematical apparatus				
		and various problem-solving methods. The lectures provide different homework for st	udents in order to			
		reinforce the material they receive during the course.				
Rules		Lesson organization				
(Educa	tional	General information on the subject will be provided for the students during lectures.				
policy	and	Student's knowledge on the previous topics will be evaluated and new topic will be ex	plained by mins			
behavi	or)	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.				
		Participation of students at all classis is important. Students should inform dean's offi	ce 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.				
	Tests					
	Those students who have informed the teacher and the dean's office about missing the test in advance		e 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.					
		midterm exam is not repeated in the final exam.	e questions of			
	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 does not follow these rules are canceled and the students are expelled from the test by		m the test by			
		getting 0 (zero).				
		The rule for completing the course	should be 600			
		or above. The students who failed the exam would be to take this subject next semester	er or next year			
		Rules of conduct for Students	i of next year.			
Disruption of the lesson and not		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.				
Week	Dates	Subject topics	Textbook/			
	(planned		Assignments			
1	04 10 21	Introduction to optical communication	[1]/pages 1 10/			
1	04.10.21	Historical development	[1] / pages 1-10/			
2	11 10 21	Antical fiber wavequides	[1] / pages 12			
2	11.10.21	Opical fiber wavegulaes	[1] / pages 12- 82/			
	11.10.21	Single-mode fibers. Photonic crystal fibers	02/			
2	10 10 21	Transmission alternativities of anti-altitum	[1] / magaza 96			
3	18.10.21	Transmission characteristics of optical fibers	[1] / pages 80- 163/			
	18.10.21	Linear scattering losses. Nonlinear scattering losses. Fiber bend loss, dispersion.	105/			
		Polarization.				
4	25.10.21	Optical fibers and cables	[1] / pages 169-			
			2071			

	25.10.21	Vapor-phase deposition techniques, Optical fibers, Cable design.	
5			[1] / pages 217-
	01.11.21	Optical fiber connections: joints, couplers and isolators	287/
		Fiber splices, Fiber connectors, Optical isolators and circulators	
6	08.11.21	Optical sources 1: the laser	[1]/pages 294-
	00 11 20	Ontical amission from comiconductors. The comiconductor injection layor	386/
	08.11.20	Optical emission from semiconductors, The semiconductor injection taser.	
		Quiz	
			Wax score 10%
7	15.11.21	Optical sources 2: the light-emitting diode	[1]/pages 396- 439/
	15.11.21	LED structures, LED characteristics, Modulation.	
8	22.11.21	Optical detectors	[1]/pages 444-
	22 11 21	Litre Letier Device twee Ortical data time winder Abarentice	496/
	22.11.21	Semiconductor photodiodes without internal gain The p-n photodiode The p-i-n	
		photodiode, Phototransistors	
9	29.11.21	Mid term exam	Max score 25%
10	06.12.21	Direct detection receiver performance	[1]/pages 502-
		considerations	545/
	06.12.21	Noise, Thermal noise, Dark current noise, Quantum noise, Digital signaling	-
		quantum noise, Analog transmission quantum noise, Receiver noise	
11	13.12.21	Optical amplification, wavelength	[1]/pages 549-
		conversion and regeneration	600/
	13.12.21	Optical amplifiers. Semiconductor optical amplifiers. Fiber and waveguide	-
	13.12.21	amplifiers.	
12	20.12.21	Integrated optics and photonics	[1]/pages 606-
			665/
			_
	20.12.21	Integrated optics and photonics technologies, <b>Optoelectronic integration</b> , <b>Photonic integrated circuits, Optical computation.</b>	
13	27.12.21	Optical fiber systems 1: intensity	[1]/pages 673 –
		modulation/direct detection	811/
	27.12.21	The optical receiver circuit, the optical transmitter circuit, digital system and	
14	02.01.02	analog system, Multiplexing strategies.	[1]/magaa 922
14	03.01.22	opical juer systems 2: concrent and phase modulated	[1]/pages 825- 897/
	03.01.22	Modulation formats, Phase shift keying, Polarization shift keying, Demodulation	
		schemes, Receiver sensitivities	
15	10.01.22	Optical fiber measurements	[1]/pages /905 – 1041/
	10.01.22	Optical networks, Optical switching networks, Optical Ethernet.	
	Ian 2022	Final Exam	Max score 40%
1	5 ann. 2022		1

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