S Y L L A B U S

General information	**Title and code of subject, number of credits**	**EENG-245 Basic Electronics – 8 ECTS credits**	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2020, spring	
	Lecturer	Master of Science (Electronics Engineering) Sabuhi Ganiyev	
	E-mail:	s.ganiyev@gmail.com	
	Phone number:	+994 77 520 73 50	
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations	Wednesday 14:00 – 15:00	
Prerequisites	PHSC 112 – Physics 2		
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	***Textbooks*:** 1. Fundamentals of electric circuits, Charles K. Alexander, Matthew N. O. Sadiku, 5th Edition, 2013 2. Electronic devices: electron flow version, Thomas L. Floyd, 9th Edition, 2012 (required). 3. Electrical Engineering: Principles and Applications, Allan R. Hambley, 6th Edition, 2014 Optional Reference Texts: 4. Grob's Basic Electronics, Schultz, Mitchel E., and Bernard Grob. 11th ed. New York, NY: McGraw-Hill, 2011. Additional Resource Texts: 5. Principles and Applications of Electrical Engineering, Giorgio Rizzoni, 5th Edition, 2014 **Auxiliary Web sources:** https://www.youtube.com/watch?v=ZRLXDiiUv8Q&list=PLSQl0a2vh4HCLqA-rhMi_Z_WnBkD3wUka https://www.youtube.com/watch?v=VfXGWWyJPmQ https://www.youtube.com/watch?v=iOSbNTYrc1s https://www.youtube.com/watch?v=P54hVuje4Dg https://www.youtube.com/watch?v=58PzPrjGsG8 https://www.youtube.com/watch?v=paDs-Hnmklo https://www.youtube.com/watch?v=Rgl4OAm9tnU		
Teaching methods	**Lecture**		x
	Group discussions at seminars		x
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 undergraund students the fundamentals of electronics. This cours mainly covers topics that are related to direct current circuits. Generally, the course consist of three sections. The first section covers basic conceps and basic lows of electric circuits. The second part studies electronic components such as diodes, capacitors, inducturs, transistors, thyristors, operational amplifier and their application. The third section analizes operation principles of oscillators and active filters. Moreover, along this course students will be introduced Multisim schematic capture and simulation software that make easier to design and analyse electrical circuits.		
Course objectives	The main objectives of this course is to introduce the main concepts electronics, and to teach fundamentals of electronic circuit design.		

Learning outcomes	What students should know by the end of the course: • Basic consepts of electric circuits. • Basic lows of electric circuits. • Fundamentals of electronic circuit design. • Operation principles of resistors, diodes, capacitors, inductors, transistors, thyristors, amplifiers, active filters and oscillators. • Design and analyze of electric circuits using Multisim software.
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. Quizzes 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. 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 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). 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.

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	**15.02.2020**	*Introduction to electronics:* The Atom. Materials Used in Electronics. Current in Semiconductors. N-Type and P-Type Semiconductors. The PN Junction. *Questions and Exercises*	[2] p. 2-16
2	***22.02.2020***	*Basic Concepts and Law:* Systems of units. Charge and current. Voltage. Power and energy. Circuit elements. Ohm's law. Nodes, branches, and loops. Kirchhoff's laws. Series resistors and voltage division. Parallel resistors and current division. *Questions and Exercises*	[1] p. 4-20 [1] p.30-52 [1] p. 24-28 [1] p. 67-81
3	***29.03.2020***	*Diodes and applications:* Diode operation. Voltage-current (*V-I*) characteristics of a diode. Diode models. Half-wave rectifiers. Full-wave rectifiers. *Questions and Exercises*	[2] p. 31-57 [2] p. 76-85
4	***07.03.2020***	*Diodes and applications:* the zener diode. Zener diode applications. The varactor diode. Optical diodes.	[2] p. 113-146 [2] p. 153-155
5	***14.03.2020***	*Capacitor and inductors:* Capacitors. Series and parallel capacitors. Inductors. Series and parallel inductors. Practical inductors Mutual inductance. Applications.	[1] p. 216-240 [3] p. 124-148

		Quiz 1(Lec1-Lec4)	[1] p. 242-251
6	***21.03.2020***	***Public holiday***	
7	***28.03.2020***	*Bipolar junction transistor:* Bipolar Junction Transistor (BJT) structure. Basic BJT operation. BJT characteristics and parameters. The BJT as an amplifier. The BJT as a switch. The phototransistor. The DC operating point. Voltage-divider bias. Other bias methods. *Questions and Exercises*	[2] p. 173-198 [2] p. 201-208 [2] p. 201-208
8	***04.04.2020***	*BJT amplifiers:* Amplifier operation. Transistor AC models. The common-emitter amplifier. The common-collector amplifier. The common-base amplifier. ***Quiz 2(Lec5-Lec6)***	[2] p. 271-300 [2] p. 310-314
9	***11.04.2020***	***Mid term exam***	
10	***18.04.2020***	*Field Effect Transistors:* The JFET. JFET characteristics and parameters. JFET biasing. The Ohmic region. The MOSFET. MOSFET Characteristics and Parameters. MOSFET Biasing. *Questions and Exercises.*	[2] p. 384-422 [2] p. 425-427
11	***25.04.2020***	*Thyristors:* The Four-Layer Diode. The Silicon-Controlled Rectifier (SCR) SCR Applications. The Diac and Triac. The Silicon-Controlled Switch (SCS). The Unijunction Transistor (UJT) *Questions and Exercises.*	[2] p. 565-588 [2] p. 596-600
12	***02.05.2020***	*The operational amplifier:* Introduction to operational amplifiers. Op-amp input modes and parameters. Negative feedback. Op-amps with negative feedback. Effects of negative feedback on Op-amp. Impedances. Bias current and offset voltage. Open-loop frequency and phase responses. Closed-loop frequency response. Comparators. Summing Amplifiers. Integrators and Differentiators. ***Quiz 3(Lec9-Lec10)***	[2] p. 602-635 [2] p. 667-693 [2] p. 636-638 [2] p. 694-698
13	***16.05.2020***	*Basic filter responses:* Filter response characteristics. Active low-pass filters. Active high-pass filters. Active band-pass filters. Active band-stop filters. Filter response measurements. *Questions and Exercises*	[2] p. 764-788 [2] p. 801-805
14	***23.05.2020***	*Oscillators:* The Oscillator. Feedback Oscillators. Oscillators with RC Feedback Circuits. Oscillators with LC Feedback Circuits. Relaxation Oscillator *Questions and Exercises*	[2] p. 807-825 [2] p. 845-850
15	***30.05.2020***	***Recap of all covered material*** ***Quiz 4(Lec11-Lec13)***	
		Final Exam	