S Y L L A B U S

General information	**Title and code of subject, number of credits**	ETR393 Basics of Circuitry- 4 credits
	Department	Electronics, Telecommunications and Radio Engineering
	Program	Bachelor
	Academic semester	2016 spring
	Lecturer	Rahman Rasulzada
	E-mail:	Mentor.rasulzada@gmail.com
	Website:	www.edmodo.com wix.com/rasulzada/mycv
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room Lectures: Seminars:
	Consultations	Edmodo website is a ideal for educational consultation. Students may post their course related questions through . For face to face consulations students needs to check Instructor's availability by contacting via email to mentor.rasulzada@gmail.com.
Course language	English	
Type of the subject	Major	
Textbooks and additional materials	***Textbooks*:** 1. Basic Electric Circuit Theory , Isaak D. Mayergoyz, W. Lawson Academic Press, Dec 2, 2012 link (for purchasing) 2.Building Arduino Projects for the Internet of Things , Adeel Javed 2016 link (softcopy)	

Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Active participation	At each lesson	5
	Term Project	At the end of the semester	20
	Lab Work / Homework/Quiz		20
	Midterm exam		20
	Final exam		35
	Final		**100**

Course description

This course provides an introduction to the broad field of electrical engineering through a series of hands-on projects. Countless devices use electronics, from cars to clocks to cameras to cell phones, but the way they work is usually hidden and often mysterious. Our objective is to demystify the world of electronics by tearing things apart (both literally and figuratively) so that you can understand how they work, and give you the skills to construct electronic devices of your own.

We'll find that not only do many devices contain some electronics inside, but most of them contain small processors as well. Once you grasp the power of adding computing to physical devices and understand how a processor interfaces with other circuitry, you can use this knowledge to construct programmable electronic devices on your own.

Part of the course is about the theoretical analysis of circuits, which you'll practice on the homework and prelab assignments. The other half is the construction and debugging of actual electronics projects, which you'll learn from making things in the lab. During the quarter, you will build:

A solar-powered cell phone charger, while learning about batteries, solar cells, power, and efficiency.
A programmable "useless box", which is a silly toy to play with on your desk. While building this project, you will use switches, motors, transistors, digital logic, and learn to control physical things with software.
An LED display, which uses the idea of multiplexing to control more lights than your micro-controller has outputs.
An electrocardiogram (ECG) to measure your heartbeat. You will learn how to build an amplifier capable of magnifying the tiny electrical signal from your heart into something your micro-controller can measure.

	By the end of the course, you will have the theory for analyzing the behavior of simple analog and digital circuits, the practical skills for constructing, programming, and debugging electronic devices of your own, and the ability to explain some of the countless ways electronic circuits are used in the modern world. Specifically, you will be able to: Predict the behavior of electrical circuits containing resistors, capacitors, inductors, transistors, diodes, switches, and motors. Construct such circuits in the lab, and control or monitor them with software running on a micro-controller. Use good electronics construction skills to build circuits that are robust and easy to debug. Use lab equipment and a logical reasoning process to debug your circuits and code when they aren't working. Give examples of how the circuit elements and techniques from the course are used in real products.
Course objectives	
Online /software resources:	**Arduino** – www.arduino.cc - Arduino is an open-source electronics platform based on easy-to-use hardware and software. It's intended for anyone making interactive projects. **EveryCircuit** (http://everycircuit.com) is a simple circuit simulation and visualization tool that runs in your browser or as an app on your phone or tablet. We'll distribute an access code to unlock the full version early on in the course. **ETAP** –http://www.etap.com- ETAP is the global market and technology leader in electrical power system modeling, design, analysis, optimization, control, operation, and automation software.
Lab sections:	Lab sections meet in every other weeks for 3 hours. (Genrally 1 week lecture , other week Lab or practical projects)
Prelabs:	Prelab is optional , but higgly reccmended to attend. The purpose of the prelab is to lay the groundwork for what you'll be doing in lab. In our experience, students who come to lab without having done the prelab work have a much harder time and end up spending longer in the lab as a result.Please check TA Ilkin Alizadeh for PreLab avaiability .
Rules (Educational policy and behavior)	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	***Lecture***	Charge, Current, and Voltage	
	lab		
2	***Lecture***	*Energy Flow and Resistors*	
	lab	*Building a Solar Charger:*	
3	***Lecture***	*Resistance; Measuring Your DMM; Diodes*	
	lab	*Basic useless box*	
4	***Lecture***	*Solar Cells, Motors, and Nodal Analysis*	

	lab	*Smart useless box*	
5	***Lecture***	Nodal Analysis, cont'd And The Useless Box	
	lab	*Arduino -1*	
6	***Lecture***	Boolean Logic, Transistors	
	lab	*Arduino -2*	
7	***Lecture***	Computers & Using Your Arduino	
	lab	*Breadboards; Boolean Logic*	
8	***Lecture***	*MOS Transistor Cheap computer*	
	lab	*Arduino -3*	
9		***Computers & Using Your Arduino***	
10	***Lecture***	**Numbers and Codes**	
	lab	*Arduino -4*	
11	***Lecture***	*Inductance and Switching Power Supplies* *(how your solar charger voltage converter works)*	
	lab	*Arduino -5*	
12	***Lecture***	**LEDs, Multiplexing, Building an LED Display**	
	lab		
13	***Lecture***	Capacitors, Impedance, RC Circuits	
	lab		
14	***Lecture***	Sound Representations	
	lab		
15	***Lecture***	*Op Amps*	
	lab		