ECTS COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
Program	**B.Sc. in Civil Engineering**	**Elective**
	B.Sc. in Computer Engineering	**Required**
	B.Sc. in Electrical-Electronics Engineering	**N/A**
	B.Sc. in Industrial Engineering	**Elective**
	B.Sc. in Mechanical Engineering	**Required**

Course Code	EE 212			
Course Title in English	Electrical and Electronic Circuits			
Course Title in Turkish	Elektrik ve Elektronik Devreleri			
Language of Instruction	English			
Type of Course	Flipped Classroom/Laboratory			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	15	75	10	-
Semester Offered	Spring			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab: 2 hours	Other: -
Estimated Student Workload	156 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	None			
Expected Prior Knowledge	None			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To learn the basic components and characteristics of electric circuits, how to analyze electric circuits with mathematical techniques and the basics of semi-conductor electronic devices.			
Course Description	This course aims to introduce the sophomore students the basic components and characteristics of electric circuits and the mathematical techniques to analyze electric circuits. The course content covers basic circuit components and their current-voltage characteristics, circuit theorems and equations, DC circuit analysis techniques, Operational amplifiers; concepts and application examples, time domain analysis of RC, RL circuits, analysis a circuit in frequency domain, finding the power and energy consumption of the circuits in frequency domain also Semi-conductor basics: concepts and semi-conductor components, Bipolar junction transistor (BJT); physical structure and operating modes, BJT as a switch, MOSFET; structure and operating modes, MOSFET as a switch. The theoretical lectures will be coupled by laboratory work.			
Course Description in Turkish	Bu ders ikinci sınıf öğrencilerini elektrik devrelerinin temel bileşenleri ve özellikleri ile elektrik devrelerini analiz edebilmek için gerekli matematiksel yöntemlerle tanıştırmaktadır. Ders içeriği temel devre bileşenleri ile onların akım-voltaj özelliklerini, devre teorem ve denklemlerini, DC devre analiz tekniklerini, İşlemsel kuvvetlendiriciler ve uygulama örnekleri, RC, RL devrelerinin zaman boyutunda analizi, frekans boyutunda bir devrenin analizi yine frekans boyutunda güç ve enerji hesaplamaları ayrıca yarıiletkenlerle ilgili kavramlar ve yarıiletken elemanlar, Bipolar Jonksiyonlu Transistör (BJT); yapısı ve türleri, anahtar olarak çalışması, MOSFET; yapısı ve türleri, anahtar olarak çalışması. Teorik derslere laboratuvar çalışmaları da eşlik etmektedir.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. comprehend the working principles of electronic devices; 2. identify electronic circuit problems, solutions and application areas; 3. conduct electronic circuit experiments by identifying required assumptions, constraints, data collection methods;			

	4. perform electric circuit experiments in the laboratory as a team work; 5. design electric circuits to meet given specifications.

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1, 2	Exam, Assignments
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	S	5	Labs
(3) an ability to communicate effectively with a range of audiences			
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	S	4	Lab Reports
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	H	3	Labs
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Dr. Onur Erkan / January 2020	
Semester	Spring 2019-2020	
Name of Instructor	Dr. Onur Erkan	
Course Contents	Week	Topic
	1.	Circuit Variables
	2.	Circuit Elements
	3.	Simple Resistive Circuits
	4.	Techniques of Circuit Analysis (Node-Voltage and Mesh-Current Methods)
	5.	Techniques of Circuit Analysis (Thevenin and Norton Equivalent Circuits, Superposition)
	6.	The Operational Amplifier
	7.	Inductance Capacitance and Mutual Inductance
	8.	Response of First Order RL and RC Circuits (General Solution for Step and Natural Responses)
	9.	Sinusoidal Steady-State Analysis (The phasor, passive circuit elements in the frequency domain)
	10.	Sinusoidal Steady-State Analysis (Circuit analysis in frequency domain)
	11.	Sinusoidal Steady-State Power Calculations
	12.	Semiconductors p-n junctions, diodes transistors, diode and its electrical behavior, Diode models, DC and AC analysis of diode circuits
	13.	Basics of BJT and their operation regions, Switching applications of BJTs.
	14.	Basics of MOSFET and their operation regions, Switching applications of MOSFETs
	15.	Final Exam/Project/Presentation Period
	16.	Final Exam/Project/Presentation Period

Required/Recommended Readings	James W. Nillson and S. Riedel, "Electric Circuits", Pearson, 10th Edition, 2014. Sedra, A. S., Smith, K.C "Microelectronic Circuits", Oxford University Press fourth edition, 1998
Teaching Methods	Lectures
Homework and Projects	Homework questions will be assigned to the students and there will be quizzes containing questions from the homework assignments.
Laboratory Work	Students will carry out experiments in the laboratory.
Computer Use	-
Other Activities	-
Assessment Methods	Types of assessment: Midterm Exams: Number 2, Ratio (%) 30 (each contributing 15%) Homework: 2, 10 Laboratory: 7, 20 Flipped Practice: 12, 10 Final Exam: 1, 30 Total: 100
Course Administration	**Instructor's office and phone number**: TBA **office hours:** TBA **email address:** TBA **Rules for attendance:** - **Missing a quiz:** No make-up will be given. **Missing a midterm**: Provided that proper documents of excuse are presented, a make-up exam will be given for each missed midterm. **A reminder of proper classroom behavior, code of student conduct**: YÖK Regulations **Academic Dishonesty and Plagiarism**: YÖK Regulations

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture	14		3		42	A*(B+C+D)
Flippped Practice	12	1		1	24	
Homework	2	6			12	A*(B+C+D)
Lab etc.	7	1.5	3	1.5	42	A*(B+C+D)
Midterm(s)	2	10	2		24	A*(B+C+D)
Final Examination	1	10	2		12	A*(B+C+D)
Total Workload					156	
Total Workload/25					6.24	