Erciyes University, Faculty of Engineering

Department of Electrical and Electronics Engineering

Course Contents

5. Semester

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EEM 305	Electronic Circuits II	3	0	4	4
Course Description:					
The purpose of this course is to provide the student with a clear presentation application of the principles of engineering electronics and to develop students' ability to analyze problems based on the understanding of its basic concepts, such as examination of the electrical characteristics of operational amplifiers. Inverting and noninverting op-amp circuits. Applications on voltage followers. Addition and subtraction circuits. Sinusoidal oscillators. Comparators. Logarithmic and antilogaritmic op-amp based circuits. Op-amp based low-pass, high-pass and band-pass filters. Applications about IC 555. Phase locked loops (PLL).					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 309	Electrical Machines	3	0	4	4
Course Description:					
Magnetic circuits and systems. Fundamentals of transformers, impedance transfer, single-phase transformers, three-phase transformers, auto-transformers, equivalent circuits of transformers. Power factor and voltage regulation. Electromechanical energy conversion, co-energy, field energy, rotating machines. Cylindrical machines, principles of dc machines, equivalent circuits of DC machines, DC generators, DC motors. Speed control methods and applications of DC motors. Introduction to AC machines.					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EEM 313	Electronic Circuits Laboratory II	0	2	2	2
Course Description:					
The purpose of this course is to provide the student with a clear presentation application of the principles of engineering electronics and to develop students' ability to analyze problems based on the understanding of its basic concepts, such as examination of the electrical characteristics of operational amplifiers. Inverting and noninverting op-amp circuits. Applications on voltage followers. Addition and subtraction circuits. Sinusoidal oscillators. Comparators, logarithmic and antilogaritmic op-amp based circuits. Op-amp based low-pass, high-pass and band-pass filters. Applications about IC 555. Phase locked loops (PLL).					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 315	Microprocessors	2	0	2	2
Course Description:					
Structural Properties of Microprocessors. Basic CPU Signals, Development of the Microprocessors. PC Data Buses, CPU Design Architectures. Memory Unit and Memory Organization. Arithmetic Logic Unit, General Properties of Registers and Counters. Control Unit, Input-Output (I/O) Units. 8085 CPU Family, Machine Cycle and Timing Diagrams. Structures of the 8085 CPU Instructions and Their Classifications. Basic Instructions and Programming. Data Transfer, Programming with Arithmetic and Logic Instructions. Loops, Counter and Delay Operations. Stack Operations, Subroutines, Code Conversion, BCD Arithmetic. Overview of the Microcontrollers					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 317	Electromagnetic Field Theory II	3	0	4	4
Course Description:					
Sources of electromagnetic fields and fundamental postulates of electrostatics in free space. Coulomb's Law. Electrostatic fields of discrete and distributed charges. Gauss' Law and electric potential. Conductors and dielectrics in electrostatic fields. Electric flux density and dielectric constant. Boundary conditions. Capacitance and capacitors. Electrostatic energy and forces. Poisson's and Laplace's Equations, method of image charges. Solution of electrostatic problems: Poisson's and Laplace's Equations, method of image charges. Steady electric currents: Point forms of Ohm's, Kirchhoff's and Joule's Laws. Fundemental Postulates of Magnetostatics in Free Space. Amper's circuital Law and Applications. Wector magnetic Potantional. The Biot-Sawart Law and Applications. Magnetization and Equivalent Current Densities and Magnetic Field intensity and Relative Permiability. Behavior of Magnetic Materials and Boundary Conditions for Magnetostatic. Magnetic Energy. Time variying fields and Maxwell's equations introduction. .					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 318	Signals and Systems	3	0	4	4
Course Description:					
Continuous and Discrete-time Signals and systems. Discrete-time linear time-invariant systems. The Z transforms and applications. Discrete Fourier transforms. Fast Fourier transforms.					

Term	Autumn				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 356	Science, Technology and Engineering	2	0	2	2
Course Description:					
What is science? What is technology? A short history of science. Science and community. The contents and limitations of scientific method. Science, research and development. Explanation of engineer term. Historical background of engineering and technology. The evaluation of engineering education and 21st century engineering education. Technology and market relations.					

6. Semester

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 306	Fundamentals of Communication Engineering	3	0	5	5
Course Description:					
Line spectrum and Fourier series. Fourier transform. Central limit theorem and convolution. Spectral analysis. Fast fourier transform (FFT).Correlation functions. Power spectral density. Linear circuits and applications. Transmission distortion. Hilbert transform.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 320	Logic Laboratory	0	2	2	2
Course Description:					
Basic logic gate structures. Combinational logic circuits, adders, and Demultiplexer multiplexer, decoder and encoder circuits and applications. Flip Flops, Counters, registers, memory elements and applications. Digital-analog and analog-digital converter circuits and applications. Arithmetic-Logic Unit design (ALU), and application.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 342	Electromagnetic Weves Theory	3	0	5	5
Course Description:					
Maxwell equations and Electromagnetic Boundary Condintions. Potential Functions. The use of Phasors and time harmonic Electromagnetics. Plane Electromagnetic waves in lossless media and transverse Electromagnetic waves. Polarization of plane waves. Plane waves in lossy media, Low-loss dielectrics media, and good conductors. Flow of Electromagnetic Power and The poynting vector and instantenous and avarage power densities. Normnal incidence of plane waves at plane boundaries. Oblique Incidence of plane waves at plane boundaries.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 302	Automatic Control	3	0	5	5
Course Description:					
Introduction to automatic control. Mathematical modeling of physical systems. Transfer function, block diagram, and signal flow graph. State-variable analysis. Characteristics of closed-loop systems. Performance of control systems. Stability of linear control systems. Frequency-domain analysis of control systems. Root locus technique.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 308	Communication Electronics	2	0	3	3
Course Description:					
Serial and parallel RLC circuits. Coupled systems. Noise and types. Gürültü factor. Noise temperature. Tuned RF amplifiers. Frequency conversion and mixers. IF amplifiers, oscillators.frequency synthesizers. Superheterodyne receivers. Amplitude modulated transmitters and receivers. Angle modulated transmitters and receivers.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 310	Radyo-TV Technique	2	0	3	3
Course Description:					
Color television technology: Television standards and forms. Radio receivers. Dream frequency and elimination. Abreast of the recipient. Stereo radio receivers: encoding, decoding					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 314	Nonlinear Circuits and Systems	2	0	3	3
Course Description:					
Introduction to nonlinear systems. Linear and nonlinear circuit elements. Nonlinear oscillators. Op-amp based nonlinear circuits. Nonlinear resistor concept.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 316	Digital Electronics	2	0	3	3
Course Description:					
Digital circuits.Transistor logic. Diode - transistor logic. Transistor - transistor logic. Emitter - coupled logic. Metal-oxide semiconductor gates. Analog switches. Multivibrators.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 322	Industrial Electronics	2	0	3	3
Course Description:					
Electromechanical circuit elements and analysis of electromechanical control circuits. DC and AC motor movement, speed and direction electrical motors. Programmable control circuit and systems (NC, PLD, PLC, CNC and DNC) analysis.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 326	Introduction to Programmable Logic Devices	2	0	3	3
Course Description:					
Programmable logic devices (SPLD, CPLD, FPGAs). Introduction to VHDL. Behavioral modeling. Data flow modeling. Structural modeling. Generics and configurations. Subprograms and packages. Basics. Mapping Statement to Gates. Model Optimization. Verification.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 330	Design Principles of Electrical Machines	2	0	3	3
Course Description:					
Basic principles of ac machines and rotating magnetic field. Fundamentals and equivalent circuit of induction machines, single and poly-phase induction machines. Operation modes of induction machines. Speed control techniques of induction motors. Linear induction motor. Fundamentals and equivalent circuit of synchronous. Special electrical machines.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 344	Microcontrollers	2	0	3	3
Course Description:					
Review of logic circuits. Algorithm development and flow charts. The PIC16FXX Microcontroller family. Program and data memory. Special function registers. I/O Port connections. Timer Module. Design examples. EEPROM data memory. CCP module. USART module. Design examples. Communication with popular peripheral elements. A high level design example.					

Term	Spring				
Code	**Course Title**	**T**	**P**	**K**	**ECTS-Cr**
EM 350	Data Communications	2	0	3	3
Course Description:					
Basic concepts, Introduction to data communication. Model used in data communication system. Transmission media used in data communication. Parallel and serial communication. Serial and asynchronous communication, RS232C, long distance RS422, RS485, synchronous communication. Error dedection and error correction. Error correction codes. Data encoding. Network topologies and switching techniques. Data communication protocols. OSI, TCP/IP. Data layer, Network layer. Frame structures, modems, ADSL, data network standards and architectures. Elements in the quality of data communication.					