

KARABÜK ÜNİVERSİTESİ
LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ

DEPARTMENT OF MECHATRONICS ENGINEERING					
Mechatronics Engineering Thesis Master's Program Course Contents					
COURSE CODE	COURSE NAME AND CONTENTS	T	A	C	ECTS
LUEE701	Scientific Research Techniques and Science Ethics	3	0	3	8
Purpose and Content	The aim of this course is to introduce all methods and models of scientific research to the student, to gain the competence to conduct scientific research and to gain the ability to apply these methods in their work. Basic concepts and information about science, structure of scientific research, scientific methods and different views on these methods, problem, research model, universe and sample, collection of data and data collection methods (quantitative and qualitative data collection techniques), recording and analysis of data, interpretation and reporting.				
MKT703	Mechanical Control Applications with Microcontrollers	3	0	3	8
Purpose and Content	1. Gain basic programming knowledge such as data type, decision making, loops, functions, subroutines. 2. Gaining knowledge about libraries, operating methods, structure design and documentation. 3. Application development with microcontrollers and microprocessors. DSP processor concepts, software defined radio concept, DSP architectures, Fixed and floating-point, dsPIC microcontrollers, real-time system design, real-time signal processing applications on dsPIC (sine signal generation, FIR and IIR filtering, FFT power spectrum calculation, PN binary arrays and data mixers, PAM modulation). Control applications on mechanical parts by processing the data coming to DSP processors				
MKT705	Computer Aided Mechanical System Design	3	0	3	8
Purpose and Content	1.To gain knowledge about computer-aided mechanical systems 2.To gain knowledge about the methods of mechanical systems 3. Providing application development skills using programs Introduction to the use of the finite element method in static stress, rigid body dynamics and mechanism analysis. Evaluating the design in terms of manufacturing at the analysis stage, preparing a model for the finite element program using solid modeling programs. Introducing the software that will visually simulate the designs that have been modeled and create manufacturing detail drawings. Detailed examination of rigid body dynamics problems encountered in robot dynamics. The course content includes the use of Solid Works program as a solid modeling program and Abaqus program in finite element analysis.				

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MKT707	Mechanical Control Simulations with Matlab	3	0	3	8
Purpose and Content	Providing mechanical system control with Matlab. Ensuring the use of Matlab program in control systems.				
MKT709	Dynamics of Electrical Machines	3	0	3	8
Purpose and Content	1.To gain knowledge about the general definition of electrical machines. 2. To gain the ability to simulate electrical machines. Dynamic behavior of direct current machines: mathematics and circuit models, transfer functions and block representations, dynamic responses. Synchronous machines: mathematical models in (d-q-0) axis set, unitized quantities, numerical simulation. Asynchronous machines: mathematical models in different reference axes, unitized quantities, numerical simulation.				
MKT711	System Modeling and Genetic Algorithms	3	0	3	8
Purpose and Content	The aim of this course is to introduce genetic algorithms and mechanical systems in which the genetic algorithm method is used, and to provide students with the ability to apply the genetic algorithm method in a system. System Analysis, Determination of System Variables, Coding of Variables, Design of Objective Function, Determination of Parameter Limit Values, Parametric Design of Objective Function; Traditional Optimization Techniques; Purpose of Optimization; Genetic Algorithms as an Optimization Method; Simple Genetic Algorithm; Theoretical Basis of Genetic Algorithms; Fundamental Theorems; Computer Coding of Genetic Algorithms; Genetic Algorithm Applications; Modeling of Engineering Design Examples, Modeling and Design of Mechanical Systems.				
MKT713	Applied Numerical Methods	3	0	3	8
Purpose and Content	To gain the application skills of numerical methods. Solution of sets of linear equations, Curve fitting and interpolation, Bezier curves, Numerical derivative and integral, Numerical solution of ordinary differential equations, Numerical solution of partial differential equations, Sample applications and programs related to the subjects.				
MKT715	Dynamics and Analysis of Mechanical Systems	3	0	3	8
Purpose and Content	To gain the ability to know the motion analysis of mechanical systems (Position, Speed, Acceleration), to gain the ability to know Force and Moment Analysis, to gain the ability to apply the subjects of Trajectory Control, Power and Motor Systems, Motion Mechanisms, Computer Simulations and Modeling. Motion analysis of mechanical systems (Position, Speed, Acceleration), Force and Moment Analyzes, Trajectory control, Power and motor systems, Motion mechanisms, computer simulations and modeling				

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MKT718	Visual Programming Applications in Mechatronics	3	0	3	8
Purpose and Content	1.To gain knowledge about visual programming. 2. To gain the ability to develop visual programming applications for mechatronic system problems. Fundamentals of visual programming, Variables and data types, Conditional expressions, Loops, Arrays, Methods, Fundamentals of image processing, Converting the image to grayscale, thresholding and negation, Rotating the image, zooming in and out, Cropping the image, Histogram and histogram equalization, Convolution, Edge finding, Morphological operations.				
MKT724	Circuit Synthesis	3	0	3	8
Purpose and Content	In this course, the student acquires the infrastructure for circuit design and designs circuits. Circuit synthesis concepts are added on top of circuit analysis concepts. Circuit design is carried out step by step				
MKT725	Real Time Microcontroller Applications with Matlab	3	0	3	8
Purpose and Content	The aim of this course is to program microcontrollers in real time via Matlab, to complete the basic definitions, elements and circuit information that make up the design, so that students can use them immediately in business life. Microcontrollers, real-time Matlab applications and microcontroller system design, interfacing of external units, I/O connections, hardware in the loop applications.				
MKT726	Single and Multi-Rotor Unmanned Aerial Vehicle Control Systems	3	0	3	8
Purpose and Content	It is aimed to understand unmanned aerial vehicle systems and realize autopilot designs. Automatic flight control basics, Control signal, Autopilot systems, Flight guidance systems, Autopilot and Flight director operating modes, Stability providing systems, Accelerometers, Sensor Combination, Flight Platform Balancing, Automatic landing systems.				
MKT729	Metal-Semiconductor Structures in Electronic Technology	3	0	3	8
Purpose and Content					
TezG & TezB	M. Sc. Thesis Research	-	-	-	26

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Purpose and Content						
UzmG & UzmB	M. Sc. Field Of Specialization	-	-	-	-	4
Purpose and Content						
SeminerG & SeminerB	M. Sc. Seminar	-	-	-	-	6
Purpose and Content						

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