COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ADVANCED ENGINEERING MATHEMATICS	5050104	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Assoc. Prof. Serdar ELHATISARI
Instructors	
Assistants	
Objectives of the Course	
Course Content	Introduction and Basic Concepts (numbers, analytical solution and numerical solution, series), Vectors, Matrices, Linear Equations, Nonlinear equations, Differential equations, Laplace Transform, Fourier Transform, Finite Differences, Numerical Derivative, Numerical Integral, Numerical Solution of Differential Equations, Partial Differential Equations
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
They can do scientific research at the graduate level, reach the necessary information, evaluate the information, interpret it and use it in practice.
Ability to use mathematical methods in advanced research on engineering topics
Ability to analyze and design a unique system that can solve engineering problems with mathematical methods

Ability to use mathematical methods required for research, software, hardware and measurement purposes

COURSE CONTENT	
Week	**Topics**
1	Introduction and Basic Concepts
2	vectors
3	Matrices
4	Infinite Series
5	Linear Equations
6	Nonlinear Equations
7	Differential equations
8	Midterm
9	Complex Variables and Functions.
10	The Residue Theorem and Its Applications
11	Solution of Differential Equations with Laplace Transform
12	Fourier Transform
13	Fourier Transform
14	Finite Differences, Numerical Derivative, Numerical Integral
15	Numerical Solution of Differential Equations
16	Final Exam

RECOMMENDED SOURCES
C.R. Wylie - L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publ. Comp.
E. Kreyszig, Advanced Engineering Mathematics, J. Wiley Publ. Comp.
B. Karaoğlu, Fizik ve Mühendislikte Matematik Yöntemler, Seçkin Yayıncılık.
ASSESSMENT

IN-TERM STUDIES	QUANTITY	PERCENTAGE
Mid-terms		30
Quizzes		
Homework		30
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination		40
Total		100
Contribution of Semester Studies to the Success Grade		40
Contribution of the Final Exam to the Success Grade		60
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			12
Seminar			
Presentation			8
Practice			5
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			15
Final examination			3
Total Work Load			

Total Work Load / 30 (h)			
ECTS Credit of the Course			130

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ADVANCED PROGRAMMING	5050105	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Assoc. Prof. Serdar ELHATISARI
Instructors	
Assistants	
Objectives of the Course	
Course Content	In the content of this course, software problem usage and top-down analysis, programming languages, how programming languages are designed and applied, introduction to programming, arrays and matrices, graphical commands and graph drawing, use of functions and methods, advanced programming, programs and functions, parameters and importing to functions, references, references to function, reference return functions, subroutines, functions, implementations, implementables, range and appearance.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Adequate knowledge of mathematics, science and related engineering disciplines; Ability to use theoretical and applied knowledge in these fields in complex engineering problems
Ability to identify, define, formulate and solve complex engineering problems; for this purpose, the ability to select and apply appropriate analysis and modeling methods

Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering practice; Ability to use information technologies effectively

COURSE CONTENT	
Week	**Topics**
1	Introduction to programming.
2	Array and matrix operations.
3	Advanced programming functions.
4	Program structures and functions, sending and receiving parameters to functions.
5	Graphic commands and graphic drawing.
6	References, sending references to functions, functions returning a reference.
7	Sub-programs, functions, procedures, methods. Passing a variable
8	Midterm
9	Basic Concepts in Machine Learning
10	Linear Regression
11	Polynomial Regression
12	Performance Evaluation Criteria for Regression and Classification
13	Bayes' Theorem and Its Use in Classification
14	Artificial neural networks
15	Support Vector Machines
16	Final Exam

RECOMMENDED SOURCES
Sinan Uğuz, Makine Öğrenmesi Teorik Yöntemleri ve Python Uygulamaları

Deitel,H.M., C How to Program, Intorducing C++ and Java, 2001.
Press, W., Numerical Recipes in C, Cambridge, 1988 .
Capper, D.,Introducing C++ for Scientist, Engineers and Mathematicians, Springer, 2001.

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice	1	30
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	30
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			12
Seminar			
Presentation			
Practice			8
Laboratory			
Internship of the Course			15
Project			10
Field Survey			
Workshop			

Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			
Final examination			3
Total Work Load			135
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	MACHINE LEARNING AND APPLICATIONS IN ENGINEERING	5050210	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	-
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Hakan AÇIKGÖZ
Instructors	-
Assistants	-
Objectives of the Course	The aim of the course is to give basic information about Machine Learning subjects and to teach them together with application examples.
Course Content	
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	-

Learning Outcomes
1. The student understands the basics of machine learning.
2. The student learns well-known instructor, no instructor, and semi-instructor learning algorithms.
3. The student can apply machine learning techniques to real world problems.
4. For a problem whose parameters are given, the student can reveal the advantages and disadvantages of different machine learning methods.

COURSE CONTENT

Week	Topics
1	Introduction to Machine Learning
2	Instructor Learning
3	Bayes' Rule
4	Decision Trees
5	Artificial Neuron Networks
6	Support Vector Machines
7	Non-linear DVM
8	Instructorless Learning
9	Midterm
10	Clustering: K-means, Mixing models
11	Hierarchical Clustering Methods
12	Using the Matlab regression interface
13	Generating entries for the regression interface
14	Selection and testing of appropriate methods from the interface
15	Evaluation of all results in terms of different metrics
16	Final Exam

RECOMMENDED SOURCES		
Introduction to Machine Learning, Pattern Recognition and Machine Learning		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	30
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	15
Field Survey		
Workshop		
Laboratory		
Presentation	1	15
Final examination	1	40
Total	4	100
Contribution of Semester Studies to the Success Grade		60

Contribution of the Final Exam to the Success Grade		40
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	3	14X45 min	42
Hours for off-the-classroom study (Pre-study, practice)			10
Homework			10
Seminar			
Presentation			
Practice			10
Laboratory			2
Internship of the Course			
Project			15
Field Survey			
Workshop			30
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			121
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**

CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ARTIFICIAL INTELLIGENCE IN ENGINEERING	5050112	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	-
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Hakan AÇIKGÖZ
Instructors	-
Assistants	-
Objectives of the Course	The aim of the course is to provide students with information on basic techniques and methods in artificial intelligence and to enable students to have the ability to use artificial intelligence methods in solving practical problems.
Course Content	
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	-

Learning Outcomes
To be able to define basic artificial intelligence concepts
Ability to formulate and solve practical problems using fundamental methods in the field of artificial intelligence.
Deciding which problem solution an artificial intelligence model might be suitable for
Ability to design an artificial intelligence model

COURSE CONTENT	
Week	**Topics**
1	Introduction to Artificial Intelligence.
2	Artificial Intelligence Applications.
3	Pattern Discovery with Artificial Intelligence Techniques.
4	Problem solving techniques.
5	Association Rules and Decision Making.
6	Properties and design of artificial neural networks.
7	Properties and design of convolutional neural networks.
8	Model development with Matlab software.
9	Midterm.
10	Introducing the general features of estimation and classification.
11	Introduction of decomposition methods for datasets.
12	Setting inputs for AI methods.
13	Coding on Matlab.
14	Using deep learning interface and examples.
15	Making applications on Matlab.
16	Final Exam.

RECOMMENDED SOURCES
Artificial Intelligence: A Systems Approach, Deep Learning, Pattern Recognition and Machine Learning

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	30
Quizzes		
Homework		
Attendance		
Practice		

Seminar		
Internship of the Course		
Project	1	15
Field Survey		
Workshop		
Laboratory		
Presentation	1	15
Final examination	1	40
Total	4	100
Contribution of Semester Studies to the Success Grade		60
Contribution of the Final Exam to the Success Grade		40
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	3	14X45 min	42
Hours for off-the-classroom study (Pre-study, practice)			
Homework			10
Seminar			10
Presentation			2
Practice			
Laboratory			
Internship of the Course			15
Project			20
Field Survey			
Workshop			
Others (……)			10
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			10

Total Work Load			121
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	NUMERICAL METHODS	5050203	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Assoc. Prof. Serdar ELHATISARI
Instructors	
Assistants	
Objectives of the Course	
Course Content	
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
To be able to calculate absolute and relative error. To be able to examine algorithms and to examine their convergence.
To be able to find approximate solutions of nonlinear equations using Newton's method. To be able to use Lagrange, Spline and Newton interpolation techniques to find values close to functions.
To be able to solve systems of linear simultaneous equations. To be able to use numerical derivative and integration methods.
To be able to solve mathematical problems numerically with the help of a software application. To be able to solve basic optimization problems numerically.

COURSE CONTENT	
Week	**Topics**
1	Introduction, analysis of errors.
2	Interpolation, Approximation Theory and Taylor Expansion
3	Interpolation-split-differences and Interpolation-cubic curve methods
4	Interpolation-least squares method
5	Finding the roots of nonlinear equations
6	Finding the roots of nonlinear equations by Newton's method
7	Finite Difference Method
8	Numerical Integral
9	Midterm
10	Numerical Derivative
11	Solution of ordinary differential equations by finite difference method
12	Matrix operations, solution of systems of linear algebraic equations and LU Decomposition Method
13	Solution of ordinary differential equations by finite difference method
14	Eigenvalue and Eigenvector Problems.
15	Numerical Optimization
16	Final Exam

RECOMMENDED SOURCES		
Nümerik Analiz G. Amirali, H. Duru, PagemA, 2002		
Nümerik Analiz M. Bayram, Sürat Yayınları, 3. baskı, Ekim 2013		
An Introduction to Numerical Analysis K.E. Atkinson, John Wiley&Sons, 1989		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**

Mid-terms		30
Quizzes		
Homework		30
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination		40
Total		100
Contribution of Semester Studies to the Success Grade		40
Contribution of the Final Exam to the Success Grade		60
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			12
Seminar			
Presentation			8
Practice			5
Laboratory			
Internship of the Course			15
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			
Final examination			3
Total Work Load			
Total Work Load / 30 (h)			

ECTS Credit of the Course			

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	RENEWABLE ENERGY SOURCES	5050108	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. İpek ATİK
Instructors	
Assistants	
Objectives of the Course	
Course Content	Energy and renewable energy types, Hydroelectric systems, Wind energy, Solar energy systems, Bioenergy, Geothermal energy, Grid integration of renewable energy
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Will be able to explain Solar Energy and its Formation, Basic Calculations about Solar Energy, Solar Energy Technologies, Solar Energy Usage Areas.
Will be able to describe the concepts of Power and Power Density Function of Wind Energy, Classification of Wind Turbines, Utilizable Wind Energy.
Will be able to define the concepts of Geothermal Energy Formation, Renewability and Sustainability in Geothermal Systems, Use of Geothermal Energy, Geothermal Energy in the World and in Turkey.
Will be able to define hydrodynamic and hydroelectric energies, explain the principles of

hydroelectric power plants and compare them with examples in Turkey and the world.
Will be able to define Ocean, Tidal and Wave Energies, Explain the Damages of Fossil Fuels and Compare with the Efficiency of Hydrogen Energy Systems.

COURSE CONTENT	
Week	**Topics**
1	Solar Energy: Solar Energy and Its Formation, Basic Accounts of Solar Energy, Solar Energy Technologies, Solar Energy Usage Areas.
2	Solar Energy: Solar Energy Usage Areas. Wind Energy: Basic Concepts of Wind Energy, Wind Formation and Classification, Data and Methods Used in Wind Energy Evaluation.
3	Wind Energy: Power and Power Density Function, Classification of Wind Turbines, Utilizable Wind Energy
4	Geothermal Energy: Formation of Geothermal Energy, Renewability and Sustainability in Geothermal Systems, Use of Geothermal Energy, Geothermal Energy in the World and in Turkey
5	bioenergy
6	Biomass resources
7	Biological and Biochemical processes
8	Environmental Energy
9	Midterm
10	Environmental Energy Resources (Water and Building Waste Heat)
11	Ocean Energy Importance and Diversity
12	Hydrogen Energy
13	Hydrogen Energy Production, Storage and Transport Technologies
14	Hydrodynamic and Hydroelectric Energy
15	Hydroelectric Power Plants, Their Importance in the World and in Turkey
16	Final Exam

RECOMMENDED SOURCES

Lecture Notes, parts of various books.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total		
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)		3X45 min.	42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			6
Seminar			
Presentation			
Practice			15
Laboratory			
Internship of the Course			
Project			8

Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			117
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	Special Field Course	5050101	1	-	-	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	To ensure that the student who starts the thesis study has a good command of the subjects related to the thesis.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
1. Ability to develop and deepen their knowledge in the relevant program area at the level of expertise, based on undergraduate level qualifications
2. To be able to solve the problems encountered in the field by using research methods
3. Gaining presentation skills
4. Being able to critically evaluate the knowledge and skills acquired in the field of expertise and direct their learning.

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Final Exam

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	16	5	80
Hours for off-the-classroom study (Pre-study, practice)	4	10	40
Homework			6
Seminar			
Presentation			
Practice	6	8	48
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)	1	12	12
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			180
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	Modeling and Control of Power Converters	5050111	1	-	3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Hakan AÇIKGÖZ
Instructors	
Assistants	
Objectives of the Course	Modeling and Controlling Basic Semiconductor Power Converters and Gaining Interpretation Skills
Course Content	Basic properties and mathematical models of Power Converters, DA-DA converter models, Obtaining the parameters of step-up converter structures, Determining the parameters of the step-down converter structures, Design of Luo converters, Sepic converters, Modeling of converter structures in Matlab environment, Soft switching techniques, Multistage voltage converters
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Gains the Ability to Recognize Semiconductor Elements
Gains the Ability to Use Semiconductor Elements in Power Electronics Circuits
Gains the Ability to Design and Conduct an Experiment on Semiconductor Power Converters
Gains Application Skills on Power Electronics

COURSE CONTENT	
Week	**Topics**
1	Main features and mathematical model of Power Converters
2	DA-DA converter models
3	Obtaining the parameters of the amplifier type converter structures
4	Determining the parameters of step-down converter structures
5	Determining the parameters of step-down converter structures
6	Design and modeling of Luo converters in Matlab environment
7	Modeling Sepic Converters in Matlab environment
8	Modeling of assembler structures in Matlab environment
9	Midterm
10	Soft switching techniques
11	Multistage voltage converters
12	Modeling and Control applications in Matlab environment
13	Modeling and Control applications in Matlab environment
14	Modeling and Control applications in Matlab environment
15	Modeling and Control applications in Matlab environment
16	Final Exam

RECOMMENDED SOURCES		
Lecture Notes		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		

Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	15	5	75
Homework			
Seminar			
Presentation			
Practice			
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms	1	10	10
Quizzes			
Homework(s)/Seminar(s)			
Final examination	1	10	10
Total Work Load			137

Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	Special Field Course	5050212	2	-	-	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	To ensure that the student who starts the thesis study has a good command of the subjects related to the thesis.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
1. Ability to develop and deepen their knowledge in the relevant program area at the level of expertise, based on undergraduate level qualifications
2. To be able to solve the problems encountered in the field by using research methods
3. Gaining presentation skills
4. Being able to critically evaluate the knowledge and skills acquired in the field of expertise and direct their learning.

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Final Exam

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	16	5	80
Hours for off-the-classroom study (Pre-study, practice)	4	10	40
Homework			6
Seminar			
Presentation			
Practice	6	8	48
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)	1	12	12
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			180
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	Seminer	5050213	2	2	-	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	To equip students with the ability to make a presentation on a specific topic.
Course Content	Oral presentation
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Learning the processes and techniques of scientific research
Accessing publications, learning reporting information
Gaining presentation skills
Gaining the ability to develop new and original ideas and methods

COURSE CONTENT

Week	Topics
1	Determination of presentation topics
2	Individual study
3	Individual study
4	Individual study
5	Individual study
6	Individual study
7	Individual study
8	Individual study
9	Individual study
10	Individual study
11	Individual study
12	Individual study
13	Individual study
14	Individual study
15	Individual study
16	Oral Presentation

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		

Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation	1	100
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	14	2	28
Hours for off-the-classroom study (Pre-study, practice)			
Homework	14	14	196
Seminar			
Presentation			
Practice			
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			224
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium				4. High		5. Very High	

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
2	Special Field Course	5050301	1	-	-	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	To ensure that the student who starts the thesis study has a good command of the subjects related to the thesis.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
1. Ability to develop and deepen their knowledge in the relevant program area at the level of expertise, based on undergraduate level qualifications
2. To be able to solve the problems encountered in the field by using research methods
3. Gaining presentation skills
4. Being able to critically evaluate the knowledge and skills acquired in the field of expertise and direct their learning.

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Final Exam

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	16	5	80
Hours for off-the-classroom study (Pre-study, practice)	4	10	40
Homework			6
Seminar			
Presentation			
Practice	6	8	48
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)	1	12	12
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			180
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
2	M.Sc. Thesis Study	5050302	1	-	-	24

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	It is aimed to examine and discuss the new developments and publications in the subjects of the students who continue their thesis work.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Based on their undergraduate level qualifications, they will be able to develop and deepen their knowledge in the relevant program area at the level of expertise.
Will be able to design experiments, evaluate and interpret the results obtained to solve the problems related to the study subject.
He/she will follow up-to-date information on the subject of study.
Will acquire the ability to write a thesis on a subject

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Studies on the thesis topic

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			
Hours for off-the-classroom study (Pre-study, practice)			
Homework			
Seminar			
Presentation			
Practice			
Laboratory			
Internship of the Course			
Project	16	55	880
Field Survey			
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			880
Total Work Load / 30 (h)			
ECTS Credit of the Course			24

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
2	Special Field Course	5050401	2	-	-	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	To ensure that the student who starts the thesis study has a good command of the subjects related to the thesis.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
1. Ability to develop and deepen their knowledge in the relevant program area at the level of expertise, based on undergraduate level qualifications
2. To be able to solve the problems encountered in the field by using research methods
3. Gaining presentation skills
4. Being able to critically evaluate the knowledge and skills acquired in the field of expertise and direct their learning.

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Final Exam

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	16	5	80
Hours for off-the-classroom study (Pre-study, practice)	4	10	40
Homework			6
Seminar			
Presentation			
Practice	6	8	48
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)	1	12	12
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			180
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
2	M.Sc. Thesis Study	5050402	2	-	-	24

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Consultant Lecturer
Instructors	
Assistants	
Objectives of the Course	It is aimed to examine and discuss the new developments and publications in the subjects of the students who continue their thesis work.
Course Content	Evaluating the study subjects of all graduate students at the thesis level under the supervision of the advisor and new developments in these subjects, following the current scientific publications
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Based on their undergraduate level qualifications, they will be able to develop and deepen their knowledge in the relevant program area at the level of expertise.
Will be able to design experiments, evaluate and interpret the results obtained to solve the problems related to the study subject.
He/she will follow up-to-date information on the subject of study.
Will acquire the ability to write a thesis on a subject

COURSE CONTENT

Week	Topics
1	Studies on the thesis topic
2	Studies on the thesis topic
3	Studies on the thesis topic
4	Studies on the thesis topic
5	Studies on the thesis topic
6	Studies on the thesis topic
7	Studies on the thesis topic
8	Studies on the thesis topic
9	Studies on the thesis topic
10	Studies on the thesis topic
11	Studies on the thesis topic
12	Studies on the thesis topic
13	Studies on the thesis topic
14	Studies on the thesis topic
15	Studies on the thesis topic
16	Studies on the thesis topic

RECOMMENDED SOURCES		
It will be given by the consultant.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms		
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	100
Field Survey		

Workshop		
Laboratory		
Presentation		
Final examination		
Total		
Contribution of Semester Studies to the Success Grade		
Contribution of the Final Exam to the Success Grade		
Total	1	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			
Hours for off-the-classroom study (Pre-study, practice)			
Homework			
Seminar			
Presentation			
Practice			
Laboratory			
Internship of the Course			
Project	16	13	715
Field Survey			
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			715
Total Work Load / 30 (h)			
ECTS Credit of the Course			24

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	SCIENTIFIC RESEARCH METHODS AND ETHICS	5050205	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Mehmet ARICI
Instructors	
Assistants	
Objectives of the Course	
Course Content	Within the scope of the course, research types, scientific method, study design and data collection, data editing and summarization, utilities, Excel macro usage areas, figure and table drawing and tools used, article writing stages, endnote usage, ethics and plagiarism will be discussed.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Complements and applies knowledge with scientific methods using limited or incomplete data; integrates knowledge from different disciplines.
He/she can discuss the issues in his/her field, defend his/her original views and communicate effectively showing his/her competence in his/her field.
The ability to examine Electrical and Electronics Engineering problems and concepts, to analyze results by simulation and/or experiment, to interpret, to make original contributions, to develop a

new scientific method or to apply a known method to a new field.
Develops new and/or original ideas and methods; develops innovative solutions in system, part or process designs.

COURSE CONTENT	
Week	**Topics**
1	Course Introduction
2	Nature of Science
3	Nature of Science
4	Access to Scientific Information
5	Scientific Research Techniques
6	Scientific Research Techniques
7	Types of Scientific Articles
8	Scientific Presentation Preparation
9	Scientific Presentation Preparation
10	Midterm
11	Introduction to Scientific Ethics
12	Professional and Ethical Rules
13	Professional and Ethical Rules
14	Professional and Ethical Rules
15	Final Exam

RECOMMENDED SOURCES		
Course Material		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**

Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			15
Seminar			
Presentation			8
Practice			6
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			2

Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			117
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	FUZZY LOGIC CONTROLLERS	5050102	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Prof. Dr. Osman BİLGİN
Instructors	
Assistants	
Objectives of the Course	
Course Content	Introduction, Basic principles of electromechanical energy conversion, Electromechanical energy conversion, coenergy, moment and force expressions, Mathematical models of electromechanical systems and their simulation with computer programs, dq models of asynchronous and synchronous machines, Rotor failures in short-circuit rotor induction motors on motor performance (stator current, examining the effects of torque fluctuations and engine efficiency).
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
To have knowledge about the basic principles of electromechanical energy conversion
Gaining the ability to examine the transient analysis of Electrical Machines

To have knowledge about conversion techniques related to speed control of electrical machines.
Gaining the ability to model and analyze electromechanical systems

COURSE CONTENT	
Week	**Topics**
1	Introduction, electromechanical energy conversion
2	Basic principles of electromechanical energy conversion
3	Coenergy, moment and force expressions
4	Extraction of mathematical models of electromechanical systems
5	Steady State Analysis of Induction Motors
6	Transient Regime Analysis of Induction Motors
7	Extraction of d-q models of asynchronous and synchronous machines
8	Park and Reverse Park Conversions
9	Midterm
10	Investigation of the effects of rotor failures on motor performance (stator current, torque fluctuations and motor efficiency) in short-circuit rotor induction motors.
11	Modeling of Electromechanical Systems and calculation of moments of inertia
12	Examination of braking techniques of electric machine
13	Investigation of braking energy recovery methods in electric transportation systems
14	Homework presentations
15	Homework presentations
16	Final Exam

RECOMMENDED SOURCES
Ion Boldea, Syed A. Nasar “Tehe Induction Machine Handbook” 2002by CRC Pres LLC. (Isbn: 0-8493-0004-5)

Chee-Mun Ong “Dynamic Smulation of Electric Machinery Using Matlab/Simulink” Prentice Hall PTR (Isbn: 0-13-723785-5) P. Krause, "Analysis of Electrical Machinery", Mc GrawHill 1987 M. Kostenko and I. Piotrovsky, "Electrical Machines" Vol. 1-2, Mir Publishers, Moscow 1974

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			
Presentation			20

Practice			20
Laboratory			
Internship of the Course			
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			138
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	CONTROL OF NONLINEAR SYSTEMS	5050211	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Mehmet ARICI
Instructors	
Assistants	
Objectives of the Course	
Course Content	
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Modeling and analysis of nonlinear systems
Ability to develop solutions to complex engineering problems
Ability to easily follow current studies in the field of study
Ability to analyze and design independently

COURSE CONTENT	
Week	**Topics**
1	System Modeling
2	System Modeling
3	Analysis methods for scalar systems
4	Analysis methods for scalar systems
5	Nonlinear structures in systems
6	Nonlinear structures in systems
7	Phase space analysis
8	Phase space analysis
9	Midterm
10	System stability
11	System stability
12	Control methods
13	Control methods
14	Laboratory and Simulation Environment Applications
15	Final Exam

RECOMMENDED SOURCES
Applied Nonlinear Control, J.J.E Slotine, Pearson, 1991.

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice	1	20

Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	40
Total	3	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	2	60
Total	3	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			8
Seminar			
Presentation			8
Practice			10
Laboratory			
Internship of the Course			10
Project			15
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			15
Final examination			2
Total Work Load			154

Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	INTRODUCTION TO MODERN CONTROL	5050106	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Mehmet ARICI
Instructors	
Assistants	
Objectives of the Course	In addition to classical control methods, modern techniques and generally analysis and design in the time domain are aimed. The course will cover modeling, stability and feedback control system design for linear time-invariant systems. In addition to theoretical knowledge, simulation and experimental studies are included in the course content.
Course Content	State-space characteristics of multivariate control systems. Controllability, observability, stability and canonical form definitions. Non-interactive control. Observer design. Reverse systems. Stationary and dynamic compensator design techniques. Summary of current work in control engineering.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
They can do scientific research at the graduate level, reach the necessary information, evaluate

the information, interpret it and use it in practice.
Learns the information about the current techniques and methods applied in the field and their limitations and gains the ability to use them in studies required for research.
It constructs the problems within the scope of Electrical Electronics and Control Engineering, and produces solutions by taking into account the technological developments.
Complements and applies knowledge with scientific methods using limited or incomplete data, integrates knowledge from different disciplines.

COURSE CONTENT	
Week	**Topics**
1	Introduction of the Course
2	Basic Definitions and Modeling
3	Modelling
4	Linear Systems
5	Linear Systems
6	Stability
7	Stability
8	State Space Analysis
9	Midterm
10	State Space Analysis
11	State Feedback Control
12	State Feedback Control
13	Observer Design
14	Linear Quadratic Regulator
15	Final Exam

RECOMMENDED SOURCES
Modern Control Engineering, Katsuhiko Ogata, 5th Edition, Pearson 2009 Control Systems Engineering, N.S.Nise, Wiley 2011

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice	1	20
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	40
Total	3	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	2	60
Total	3	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			12
Seminar			
Presentation			8

Practice			10
Laboratory			16
Internship of the Course			15
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			15
Final examination			3
Total Work Load			166
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	SPECIAL ELECTRICAL MACHINES	5050103	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Prof. Dr. Osman BİLGİN
Instructors	
Assistants	
Objectives of the Course	
Course Content	Servo Motors and their general structures, Stepper Motors, Linear electric motor types, Reluctance motors and their drivers.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Having Knowledge About Working Patterns of Special Electrical Machines
Having Knowledge about Servo Systems and Control Techniques
Learning About Motor Drive Systems and Speed Control Techniques
Obtaining Information on Modeling and Analysis of Engines in Computer Environment

COURSE CONTENT	
Week	**Topics**
1	Electromechanical energy conversion principles
2	The current state of technology of switched reluctance motors
3	Structural features of ARMs, operating zones, speed-torque characteristics, multi-phase operating status, design of phase and pole numbers
4	Control Strategy of ARMs with Power Electronics
5	Microcontroller Based Drivers, DSP Based Drivers
6	Engine Cooling,
7	Modeling of Engine and Calculation of Engine Characteristics by Numerical Method
8	Structural Properties of STEP Motors, Working Regions, Speed Moment Characteristics, Multi-Phase Operation Status, Phase and Pole Number Design
9	Midterm
10	Control Strategy of STEP Motors with Power Electronics
11	Permanent Magnet Synchronous Motors
12	Engine Types and Industrial Applications
13	Permanent Magnets Used in Motors and Their Technical Properties
14	Derivation of Equivalent Circuit and Fundamental Equations of Motors
15	Homework Presentations
16	Final Exam

RECOMMENDED SOURCES
Ion Boldea, Syed A. Nasar "Tehe Induction Machine Handbook" 2002by CRC Pres LLC. (Isbn: 0-8493-0004-5) Chee-Mun Ong "Dynamic Smulation of Electric Machinery Using Matlab/Simulink"

Prentice Hall PTR (Isbn: 0-13-723785-5)

P. Krause, "Analysis of Electrical Machinery", Mc GrawHill 1987

M. Kostenko and I. Piotrovsky, "Electrical Machines" Vol. 1-2, Mir Publishers, Moscow 1974

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			52
Hours for off-the-classroom study (Pre-study, practice)			
Homework			
Seminar			
Presentation			42
Practice			42

Laboratory			10
Internship of the Course			
Project			
Field Survey			20
Workshop			
Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			116
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ROBOT MODELING AND CONTROL	5050107	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Mehmet ARICI
Instructors	
Assistants	
Objectives of the Course	
Course Content	Forward and inverse kinematics. Control of actuators in robot mechanism. Independent joint control. Robot dynamics. Multivariable control. Force control. Geometric nonlinear control. Robotic sensing equipment. Optical sensor, encoder, speed, force and torque sensors, distance sensors.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
They can do scientific research at the graduate level, reach the necessary information, evaluate the information, interpret it and use it in practice.
Learns the information about the current techniques and methods applied in the field and their limitations and gains the ability to use them in studies required for research.
It constructs the problems within the scope of Electrical Electronics and Control Engineering, and produces solutions by taking into account the technological developments.

Complements and applies knowledge with scientific methods using limited or incomplete data; integrates knowledge from different disciplines.

COURSE CONTENT	
Week	**Topics**
1	Introduction
2	Solid Motion and Homogeneous Transformation
3	Homogeneous Transformation
4	Forward and Inverse Kinematics
5	Forward and Inverse Kinematics
6	Independent Joint Control
7	Independent Joint Control
8	Dynamic
9	Midterm
10	Multivariable Control
11	Non-Linear Control
12	Robotic Hardware
13	Sensors and Actuators
14	Sensors and Actors
15	Final Exam

RECOMMENDED SOURCES		
Adaptive Control Tutorials, Petros Ioannou, SIAM, 2006. Applied Nonlinear Control, J.J.E Slotine, Pearson, 1991.		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	20

Quizzes		
Homework	1	20
Attendance		
Practice	1	10
Seminar		
Internship of the Course		
Project	1	10
Field Survey		
Workshop		
Laboratory		
Presentation	1	10
Final examination	1	30
Total	6	100
Contribution of Semester Studies to the Success Grade	3	40
Contribution of the Final Exam to the Success Grade	3	60
Total	6	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			
Presentation			10
Practice			10
Laboratory			
Internship of the Course			20
Project			15
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			

Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			153
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	DESIGN AND DESIGN OPTIMIZATION OF FIXED MAGNET SYNCHRONOUS MACHINES	5050202	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Prof. Dr. Osman BİLGİN
Instructors	
Assistants	
Objectives of the Course	Introduction, Synchronous Motor types, permanent magnet synchronous motor types and industrial uses, permanent magnets used in motors and their technical features, optimization techniques and selection of the appropriate algorithm for motor design, development of the design algorithm and preparation of a sample design program
Course Content	The overall aim of the course is to enable students to conduct research independently and to specialize in topics related to their thesis. In this context, students will be able to discuss the materials and methods necessary to carry out their thesis research with their academic advisors. Students will have detailed information about the thesis work and will be able to find solutions to the problems they encounter during their studies.
Teaching-Learning Methods and Techniques Used in the Course	

Internship of the Course (If there is)	

Learning Outcomes
Knowledge of engine design processes
Knowledge of optimization techniques
Gain the ability to adapt optimization techniques to engine design
Gaining the ability to analyze the accuracy of optimization results

COURSE CONTENT	
Week	**Topics**
1	Introduction, Synchronous Motor types,
2	permanent magnet synchronous motors
3	Engine types and industrial applications
4	Permanent magnets used in motors and their technical features
5	Derivation of equivalent circuit and basic equations of motors
6	Optimization techniques and derivation of basic equations for engine design
7	Optimization techniques and selection of the appropriate algorithm for engine design
8	Establishment of equations related to the design algorithm
9	Midterm
10	Determination of limit ranges for optimization
11	Verification of optimization results with simulation programs
12	Verification of optimization results with simulation programs
13	Accuracy analysis of program outputs
14	End of term homework presentations
15	End of term homework presentations

16	Final Exam

RECOMMENDED SOURCES
Kay Hameyer, Ronnie Belmanns, R. Belmans “Numerical Modelling and Design of Electrical Machines and Devices Say, M.G., The performance and design of alternating current machines; transformers, three-phase induction motors and synchronous machines, 3rd ed., Pitman, 2000. M. Kostenko and I. Piotrovsky, "Electrical Machines" Vol. 1-2 Still A. ve C.S.Siskind, Elements of Electrical Machines Design, Mc Graw Hill, New York, 1976 Boduroğlu, T., Elektrik Makinaları Dersleri: Senkron Makinaların Teori, Hesap ve Konstrüksiyonu, Cilt III, Kısım 2, İTÜ Yayınları, 1986

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE

Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			2
Presentation			20
Practice			
Laboratory			
Internship of the Course			20
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			138
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2

CLO: Course Learning Outcomes PO: Programe Outcomes					
Contribution level	1. Very low	2. Low	3. Medium	4. High	5. Very High

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	INTRODUCTION TO MODERN CONTROL	5050204	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Mehmet ARICI
Instructors	
Assistants	
Objectives of the Course	
Course Content	Possible system uncertainties and the need for adaptive control. Making classical control methods suitable for adaptive control. Writing systems with uncertainty in parametric form. System stability. Basic estimation methods. Model reference adaptive control. Adaptive pole placement method. Computer simulation examples.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Develops new and/or original ideas and methods; develops innovative solutions in system, part or process designs.

Researches and defines the social, societal, economic and ethical dimensions of practices related to the field of expertise.
Leads multi-disciplinary teams, develops solution approaches and takes responsibility in complex situations.
They gain the ability to follow the literature, make technical presentations, listen and write articles at academic level, and can convey their own work in written, oral and visual formats in national or international platforms.

COURSE CONTENT	
Week	**Topics**
1	Introduction
2	Possible System Uncertainties
3	Classical Control Theory
4	Writing Systems with Uncertainty in Parametric Form
5	System Stability Analysis
6	Basic Estimation Methods
7	Model Reference Adaptive Control
8	Model Reference Adaptive Control
9	Midterm
10	Simulation Studies
11	Overview of Literature Practices
12	Overview of Literature Practices
13	Overview of Literature Practices
14	Overview of Literature Practices
15	Final Exam

RECOMMENDED SOURCES
Adaptive Control Tutorials, Petros Ioannou, SIAM, 2006. Applied Nonlinear Control, J.J.E Slotine, Pearson, 1991.

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			
Presentation			10

Practice			10
Laboratory			
Internship of the Course			20
Project			15
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			153
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	RENEWABLE ENERGY SOURCES AND ELECTRIC ENERGY GENERATION	5050201	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Prof. Dr. Osman BİLGİN
Instructors	
Assistants	
Objectives of the Course	
Course Content	Energy and renewable energy types, Hydroelectric systems, Wind energy, Solar energy systems, Bioenergy, Geothermal energy, Grid integration of renewable energy
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Will be able to explain Solar Energy and its Formation, Basic Calculations about Solar Energy, Solar Energy Technologies, Solar Energy Usage Areas.
Will be able to describe the concepts of Power and Power Density Function of Wind Energy, Classification of Wind Turbines, Utilizable Wind Energy.

Will be able to define the concepts of Geothermal Energy Formation, Renewability and Sustainability in Geothermal Systems, Use of Geothermal Energy, Geothermal Energy in the World and in Turkey.
Will be able to define hydrodynamic and hydroelectric energies, explain the principles of hydroelectric power plants and compare them with examples in Turkey and the world.
Will be able to define Ocean, Tidal and Wave Energies, Explain the Damages of Fossil Fuels and Compare with the Efficiency of Hydrogen Energy Systems.

COURSE CONTENT	
Week	**Topics**
1	Electricity Energy Production and Its Importance. Fundamentals of Electromechanical Energy Conversion. Conservation of Energy and Energy Relations.
2	Energy Economics, Electrical Load Development, Classification of Loads, Load Estimation Methods,
3	Power Plant Types
4	Selection of Plant Location and Type. Selection of Machinery Used in Plants. Synchronization Facilities, Energy Connection Systems in Power Plants.
5	Examination of Hydroelectric Power Plants and Power Plant Types
6	Examination of thermal power plants and working principles
7	Working principles and comparison of natural gas and combined cycle natural gas power plants
8	Solar Energy: Solar Energy and Its Formation, Basic Calculations Related to Solar Energy, Solar Energy Technologies, Solar Energy Usage Areas.
9	Midterm
10	Wind Energy: Basic Concepts of Wind Energy, Wind Formation and Classification, Data and Methods Used in Wind Energy Evaluation.
11	Wind Energy: Power and Power Density Function, Classification of Wind Turbines, Utilizable Wind Energy
12	Geothermal Energy: Formation of Geothermal Energy, Renewability and Sustainability in Geothermal Systems, Use of Geothermal Energy, Geothermal Energy in the World and

	in Turkey
13	Geothermal Energy and Electric Power Generation
14	Biomass Resources
15	Biological And Biochemical Processes
16	Final Exam

RECOMMENDED SOURCES
İ., Güney, "Elektrik Tesisleri I (Üretim Merkezleri)" Marmara Üniversitesi Yayınları, İstsnbul 1993
M.V., DEsphande "Elements of Electrical Power Station Design" Sir İssac Pitman and Sons Ltd. press London
Y. Heper "Buhar Santralları Teorisi ve Uyygulaması" ODTÜ yayınları Ankara 2001
İ., Göneneç "Elektrik Santralları I, II" İTÜ Yayınları İstanbul 1966

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			2
Presentation			20
Practice			
Laboratory			
Internship of the Course			20
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			138
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5

CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ADVANCED LIGHTING TECHNOLOGIES	5050207	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. İpek ATİK
Instructors	
Assistants	
Objectives of the Course	
Course Content	Examining the basic concepts of light sources; efficiency factor, color rendering, color temperature, economic life, cost of ownership/Light sources produced with new technologies; Fluorescent lamps produced in accordance with EN 12464-1, HACCP standards, light sources produced with bridge technology used in cold rooms and freezer warehouses, newly developed fluorescent lamps used in special places such as tunnels, petro-chemistry industry, halogen dichroic lamps developed for fiber optic applications, high Investigation of ceramic metal Halide bulbs with lumen efficiency and ceramic technology, compact metal Halide bulbs and their working principles, colored metal Halide bulbs, energy saving compact fluorescent bulbs redesigned with bridge technology, emergency lighting kits and application areas/Starters and igniters; starters that do not contain radioactive materials, their structures and working principles electronic starters, their structures and working principles/Ballasts; standard electronic ballasts. Dimmerable electronic ballasts, basic structure of electronic ballasts, assembly schemes and technical features, electromagnetic ballasts with multiple power options, construction working principle, connection forms and advantages, advantages and economic advantages of electronic ballasts over conventional ballasts, double bulb compact ballasts, structures, working principles, life, examination in terms of lumen stability, digital addressable ballast and control systems/Dimmering techniques; dimmer(1-10V digital: phase dimm), branch control methods, other control methods, dimmer of metal

	halide lamps, dimmer of fluorescent lamps/Led fixtures technology; examination of light production with led technology, examination of general properties of leds and their luminous-electrical characteristics, properties of RGB and power leds and luminous and electrical properties of luminaires, examination of electromagnetic compatibility of luminaires/Fiber optic lighting; Light transmission in fiber optic cables, structure and properties of fiber optic cables, light generators and lenses, advantages of fiber optic lighting/Lighting calculation methods with the help of computer programs; Calculation methods of IESNA, CIBSE, CIE, other lighting package programs, project design criteria and an exemplary evaluation, technical evaluations on lighting economy and lighting losses in Turkey.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
To give information about the developing lighting technologies and applications in the world in the last few years.
Developing application skills in lighting.
To gain experience in lighting and lighting technologies.

COURSE CONTENT	
Week	**Topics**
1	Examining the basic concepts of light sources; efficiency factor, color rendering, color temperature, economic life, cost of ownership
2	Light sources produced with new technologies; Fluorescent lamps produced in accordance with EN 12464-1, HACCP standards Light sources produced with bridge technology used in cold rooms and freezer warehouses Newly developed fluorescent lamps used in special places such as tunnels, petro-chemistry industry
3	Halogen dichroic lamps developed for fiber optic applications High lumen efficiency ceramic metal Halide lamps and investigation of ceramic technology Compact metal Halide lamps and their working principles, colored metal Halide lamps
4	Energy saving compact fluorescent lamps redesigned with bridge technology Emergency lighting kits and application areas
5	Starters and igniters Radioactive material-free starters, their construction and working principles Electronic starters, their construction and working principles
6	Ballasts Standard electronic ballasts, dimmerable electronic ballasts, basic structure of electronic ballasts, assembly diagrams and technical features, electromagnetic ballasts

	with multiple power options, construction working principle, connection forms to the circuit and the advantages they provide
7	Advantages and economic advantages of electronic ballasts over conventional ballasts Investigation of double bulb compact ballasts in terms of their structure, working principles, life, lumen stability Digital addressable ballast and control systems
8	Dimmering techniques Dimmering(1-10V digital: phase dimm), DALI control methods Other control methods
9	Midterm
10	Dimmer of metal halide lamps Dimmer of fluorescent lamps
11	Led luminaires technology Examination of light production with Led technology Examination of general properties and luminous-electrical characteristics of leds
12	Characteristics of RGB and power leds and luminous and electrical properties of luminaires, Investigation of electromagnetic compatibility of luminaires
13	Fiber optic lighting Light transmission in fiber optic cables Structure and properties of fiber optic cables Light generators and lenses Advantages of fiber optic lighting
14	Lighting calculation methods with the help of computer programs IESNA, CIBSE, CIE calculation methods
15	Other lighting package programs
16	Final Exam

RECOMMENDED SOURCES

- Aydınlatma Tasarımı ve Proje Uygulamaları, Adem Ünal, Birsen Yayınevi, 2004 ISBN:9755113827X
- The Art of Illumination :Residential Lighting Design by Glenn M.Johnson, McGraw-Hill Professional; (October 30.1998), ASIN:0070329591
- Applied Illumination Engineering (2nd Edition) by Jack L. Lindsey,Staff Lindsey

Principles of Illumination. By John E.Traister Bobbs-Merrill Co; (January 1974) ASIN: 067220973Xx

ASSESSMENT

IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		

Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total		
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)		3X45 min.	42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			6
Seminar			
Presentation			
Practice			15
Laboratory			
Internship of the Course			
Project			8
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			117
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium				4. High		5. Very High	

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ADVANCED QUANTUM MECHANICS	5050208	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Assoc. Prof. Serdar ELHATISARI
Instructors	
Assistants	
Objectives of the Course	
Course Content	
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
It includes the fundamentals of quantum mechanics. Accepting the fundamentals of quantum fundamentals, mechanics, generality and design principles, in such a way as to be applicable and applicable.
Physics and Mathematics, has the ability to apply.
(measurement, mechanism, etc.) has the ability to experiment, test and analyze. Waves Theory, practicality and practical applications
To be able to formulate and produce physics problems. Ability to use techniques and tools necessary for physics applications.

COURSE CONTENT	
Week	**Topics**
1	MATHEMATICAL FOUNDATIONS OF QUANTUM MECHANICS
2	PHYSICAL BASICS OF QUANTUM MECHANICS. MODERN PHYSICS
3	SCHRODINGER WAVE EQUATION.
4	WAVE FUNCTION
5	EQUITY AND EDI FUNCTIONS, EXPANSION POSTULATE, INTERPRETATION AND ITS APPLICATIONS
6	CONDITIONAL PROBLEMS IN A DIMENSION
7	ONE-DIMENSIONAL PROBLEMS, STRUCTURE OF QUANTUM MECHANICS
8	OPERATORS, SYMMETRY AND CONSERVATION LAWS
9	MIDTERM
10	MULTI-DIMENSIONAL PROBLEMS. DEPENDING ON VARIABLES.
11	MULTI-PARTICLE WAVE FUNCTIONS
12	MATRIX MECHANICS. THE ANGULAR MOMENTUM PROBLEM.
13	GLOBAL SYMMETRIC PROBLEMS. HYDROGEN ATOMS.
14	SPIN AND IDENTIFIC PARTICLES
15	PERTURBATION THEORY
16	REPEAT AND EXAM

RECOMMENDED SOURCES
David Griffiths, “Introduction to Quantum Mechanics” Second Edition Benjamin Cummings (2004) John David Jackson, "Mathematics for Quantum Mechanics, An Introductory Survey of Operators, Eigenvalues, and Linear Vector Spaces". Dovers (2012) Stephen Gasiorowicz “Quantum Physics” Third Edition, John Wiley (2003)

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	30
Quizzes		
Homework	1	30
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	40
Total	3	100
Contribution of Semester Studies to the Success Grade	2	60
Contribution of the Final Exam to the Success Grade	1	40
Total	3	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)			42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			10
Seminar			
Presentation			8
Practice			12
Laboratory			
Internship of the Course			15
Project			
Field Survey			
Workshop			
Others (……)			
Mid-terms			3
Quizzes			
Homework(s)/Seminar(s)			
Final examination			3

Total Work Load			135
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	ELECTRIC ENERGY SYSTEM ANALYSIS AND MODELING	5050109	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. İpek ATİK
Instructors	
Assistants	
Objectives of the Course	This course presents the necessary theoretical materials for the calculation and analysis of energy systems. The main aim of the course is to learn computational methods suitable for large scale power systems. The theoretical computational methods learned will be applied to problems such as power flow, stability and grid transients used in the analysis of energy systems
Course Content	Introduction of energy systems, basic principles and models of system elements, systems reduced to units, calculation of bus admittance matrix, load flow analysis and solution methods, calculation of busbar impedance matrix, reflection of physical changes in the network to the busbar impedance matrix, network models for short circuit analysis and short circuit analysis, economic operation of power systems, calculation of transmission losses and B-coefficients, modeling and analysis of three-phase energy systems, transients and stability analysis in energy systems.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes

1.
2.
3.
4.
5.

COURSE CONTENT	
Week	**Topics**
1	Introduction of energy systems
2	Basic principles and models of system elements
3	Unitized systems
4	Calculation of bus admittance matrix
5	Load flow analysis and solution methods
6	Calculation of the busbar impedance matrix
7	Reflecting the physical changes in the network to the busbar impedance matrix
8	Network models and short-circuit analyzes for short-circuit analysis
9	Midterm
10	Economical operation of power systems
11	Transmission losses
12	Calculation of B-coefficients
13	Modeling and analysis of three-phase energy systems
14	Transient events in energy systems
15	Stability analysis
16	Final Exam

RECOMMENDED SOURCES

Power System Analysis		
ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total		
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)		3X45 min.	52
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			6
Seminar			
Presentation			
Practice			15
Laboratory			
Internship of the Course			
Project			8

Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			127
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	FLEXIBLE AC TRANSMISSION SYSTEMS	5050206	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	-
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Hakan AÇIKGÖZ
Instructors	-
Assistants	-
Objectives of the Course	To provide students with advanced knowledge about Flexible Alternating Current Transmission Systems.
Course Content	Electrical Power Systems Overview/ Energy Transmission Lines Overview/ Introduction of Semiconductor Power Elements, Converter Concept and Converters/ Flexible AC Transmission Systems (FACTS), Benefits of Using FACTS/ Static Shunt Compensators, Purpose of Shunt Compensation, Static Reactive Power Compensator (SVC)) and Static Synchronous Compensator (STATCOM) Devices Working Principles/ Comparison of SVC and STATCOM Devices/ Static Series Compensator, Purpose of Series Compensation, Gate-Switched Thyristor (GTO) controlled serial capacitance (GCSC) and Thyristor Switched Serial Capacitance (TSSC) Devices/ Thyristor Controlled Series Capacitance (TCSC) and Static Synchronous Series Compensator (SSSC) Devices
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	-

Learning Outcomes
1. Gaining knowledge about Flexible AC Transmission Systems
2. They can analyze the case of FACTS device working alone or in combination for the situation in an

imaginary power system operation
3. Leveraging a custom FACTS industrial design and using the powers of these operating parameters MATLAB

COURSE CONTENT	
Week	**Topics**
1	Overview of Electrical Power Systems
2	Overview of Energy Transmission Lines
3	Flexible AC Transmission Systems (FACTS), Benefits of Using FACTS
4	Introduction of Semiconductor Power Elements, Converter Concept and Converters
5	Static Shunt Compensators, Purpose of Shunt Compensation, Working Principles of Static Reactive Power Compensator (SVC) and Static Synchronous Compensator (STATCOM) Devices
6	Comparison of SVC and STATCOM Devices
7	Static Series Compensators, Purpose of Series Compensation, Gate Quenched Thyristor (GTO) controlled series capacitance (GCSC) and Thyristor Switched Serial Capacitance (TSSC) Devices
8	Static Voltage Regulator
9	Midterm
10	Phase Angle Regulator
11	Unified Power Flow Controller
12	Harmonics and Harmonic Filters
13	High Voltage Direct Current Energy Systems
14	Modeling different devices on Matlab
15	Making and evaluating general purpose models on Matlab
16	Final Exam

RECOMMENDED SOURCES
Understanding FACTS: Concepts and Technology of Flexible AC TransmissionSystems

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	30
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	15

Field Survey		
Workshop		
Laboratory		
Presentation	1	15
Final examination	1	40
Total	4	100
Contribution of Semester Studies to the Success Grade		60
Contribution of the Final Exam to the Success Grade		40
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	3	14X45 min	42
Hours for off-the-classroom study (Pre-study, practice)			
Homework			10
Seminar			10
Presentation			2
Practice			
Laboratory			
Internship of the Course			15
Project			20
Field Survey			
Workshop			
Others (……)			10
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			42
Total Work Load			153
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low			2. Low		3. Medium			4. High		5. Very High	

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	HYBRID ELECTRIC ENERGY SYSTEMS	5050209	2		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	
Prerequisites	-
Department/Program Coordinator	Asst. Prof. İpek ATİK
Instructors	
Assistants	
Objectives of the Course	The main purpose of the course is to learn to determine the optimum working conditions of wind, solar and hydrogen energy systems together, independent of the grid or connected to the grid. To learn solar and wind energy systems as renewable energy sources.
Course Content	Energy, sustainability and renewable concepts (Fundamentals of energy, sustainability, renewable) - Fundamentals of power systems - Power quality - Photovoltaic systems (Photovoltaic Systems) - Wind Turbines - Microturbines (Microturbines)) - Hydrogen Fuel Cells - Distributed Energy Production Systems (Distributed Generation) - Stand alone hybrid power systems - On grid hybrid power systems (On grid power systems) - Hybrid power systems control algorithms (Control algorithms for hybrid power systems)
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	

Learning Outcomes
Students learn the effect of wind energy and wind classes.
The working logic of wind turbines is learned. The parts that make up wind turbines are learned.

The mathematical model of wind turbines is learned.
Solar energy and solar cells are learned. The mathematical model of solar cells is learned.
Hydrogen fuel cells are learned. The off-grid and grid-dependent working conditions of distributed energy generation systems are learned.

COURSE CONTENT	
Week	**Topics**
1	Investigation of working principle and characteristics of PEM type fuel cell, DC-DC converter and battery
2	Obtaining fuel cell characteristic curves
3	Detection of energy conversion losses during charging and discharging of batteries
4	Determination of charge-discharge characteristics of batteries
5	Obtaining electrical energy from solar energy
6	Obtaining electrical energy from wind energy
7	Obtaining hydrogen (H2) by electrolysis method
8	Storage of H2 gas (tank charge-discharge characteristics)
9	Midterm
10	Evaluation of the liquid-cooled fuel cell
11	Effect of coolant and air quantity on fuel cell performance
12	Testing day and night energy profiles
13	Calculation of electrolyzer efficiency
14	Energy conversion and efficiency analysis
15	Off-grid hybrid power system simulation Solar energy systems
16	Final Exam

RECOMMENDED SOURCES
Nicu Bizon, Hossein Shayeghi, Naser Mahdavi Tabatabaei, Analysis, Control and Optimal Operations in Hybrid Power Systems, Springer - S. Sumathi, L. Ashok Kumar, P. Surekha, Solar PV

and Wind Energy Conversion Systems, Springer - Thomas Ackermann, Wind Power in Power Systems, Springer - Antonio Luque , Steven Hegedus, Handbook of photovoltaic science and engineering, Wiley - Hashem Nehrir, Caisheng Wang, Modeling and Control of Fuel Cells, Wiley -"Power System Analysis," by J.J. Grainger, W.D. Stevenson, McGraw Hills, 1994

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	40
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project		
Field Survey		
Workshop		
Laboratory		
Presentation		
Final examination	1	60
Total	2	100
Contribution of Semester Studies to the Success Grade	1	40
Contribution of the Final Exam to the Success Grade	1	60
Total	2	100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)		3X45 min.	42
Hours for off-the-classroom study (Pre-study, practice)			42
Homework			6
Seminar			
Presentation			
Practice			15
Laboratory			
Internship of the Course			

Project			8
Field Survey			
Workshop			
Others (……)			
Mid-terms			2
Quizzes			
Homework(s)/Seminar(s)			
Final examination			2
Total Work Load			117
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PO12**
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		

COURSE INFORMATION FORM

	Course Information					
Year of Curriculum	**Course Title**	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
1	FUZZY LOGIC CONTROLLERS	5050110	1		3	6

Language of Instruction	Turkish
Course Level	Master programme
Department/Program	Electrical - Electronics Engineering
Education Type	Formal Learning
Course Type	-
Prerequisites	-
Department/Program Coordinator	Asst. Prof. Hakan AÇIKGÖZ
Instructors	-
Assistants	-
Objectives of the Course	These courses provide the necessary theoretical materials for the design of purchasing intents. Taking the main course is a suitable learnable for the inspections of inaccurate systems. User designs reviews will apply to system controls with user controls.
Course Content	Classical sets and their properties, fuzzy set theories, basic properties of Type-1 and Type-2 fuzzy controllers, fuzzy membership functions, fuzzification methods and principles, knowledge base design, defuzzification methods, modeling of Type-1 and Type-2 fuzzy controllers, fuzzy logic Matlab application examples and performance characteristics of controllers.
Teaching-Learning Methods and Techniques Used in the Course	
Internship of the Course (If there is)	-

Learning Outcomes
1. Examination of classical controller structures
2. Methods used in fuzzy logic and applications of fuzzy logic
3. Recognition of fuzzy sets, membership functions, fuzzy propositions, fuzzy models and fuzzy values
4. Comprehending the inferences of fuzzy quantifiers, conditional and constrained fuzzy propositions,

conditional and constrained fuzzy propositions
5. Making fuzzy relations, fuzzy functions and their applications
6. Computer applications of artificial neural networks, genetic algorithms, fuzzy logic

COURSE CONTENT	
Week	**Topics**
1	Introduction of energy systems
2	Fuzzy sets, membership functions and basic properties
3	Fuzzy propositions, fuzzy models, fuzzy values
4	Fuzzy quantifiers, conditional and constrained fuzzy propositions
5	Inferences from conditional and constrained fuzzy propositions
6	Level and level fuzzy sets, fuzzy set operations
7	Extended fuzzy sets
8	Fuzzy relationship equations, rule base extraction
9	Midterm
10	Blurring
11	Inference mechanisms
12	clarification
13	Mamdani and Sugeno fuzzy system model
14	Fuzzy relations, fuzzy functions and basic properties
15	Artificial neural networks
16	Final Exam

RECOMMENDED SOURCES
Fuzzy Logic with Engineering Applications, An Introduction to Fuzzy Logic and Fuzzy Sets

ASSESSMENT		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE**
Mid-terms	1	30
Quizzes		
Homework		
Attendance		
Practice		
Seminar		
Internship of the Course		
Project	1	15
Field Survey		

Workshop		
Laboratory		
Presentation	1	15
Final examination	1	40
Total	4	100
Contribution of Semester Studies to the Success Grade		60
Contribution of the Final Exam to the Success Grade		40
Total		100

ECTS/WORKLOAD TABLE			
Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (Including the exam week: 15x Total course hours)	3	14X45 min	42
Hours for off-the-classroom study (Pre-study, practice)			
Homework			10
Seminar			10
Presentation			2
Practice			10
Laboratory			
Internship of the Course			15
Project			20
Field Survey			2
Workshop			
Others (……)			
Mid-terms			
Quizzes			
Homework(s)/Seminar(s)			
Final examination			
Total Work Load			111
Total Work Load / 30 (h)			
ECTS Credit of the Course			6

ASSOCIATING THE LEARNING OUTCOMES OF THE COURSE WITH THE PROGRAM OUTCOMES

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO12
CLO1	1	3	1	5	5	2	5	2	2	2	3	5
CLO2	2	2	2	3	5	5	2	5	2	3	1	5
CLO3	5	5	2	1	5	5	2	5	2	5	2	2
CLO4	1	5	5	2	5	2	5	1	3	1	5	1
CLO5	2	3	1	4	1	3	1	5	5	2	5	2
CLO: Course Learning Outcomes PO: Programe Outcomes												
Contribution level	1. Very low		2. Low		3. Medium			4. High		5. Very High		