ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
ELECTRICAL AND COMPUTER ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
DESIGN of VARIABLE RELUCTANCE MACHINES	ECE-607	FALL	3 + 0	3	10

Prerequisite Courses	NONE

Type	Selective
Language	English
Coordinator	Prof. Irfan Alan
Instructor	Prof. Irfan Alan
Adjunt	None
Aim	To understand the operating principles of variable reluctance machines and step motors, to investigate the types of machines and drives, to review the literature about the research and developments made, to analyze a certain type of machine together with its drive by simulating by a computer simulation program and to ponder upon possible new configurations.
Learning Outcomes	• To be able to collect and understand information about the types and operating principles of Variable Reluctance Machines (VRM) available in literature • To learn to simulate the operation and analyze in detail the various types of VRM configurations by means of a simulation program • To be able to prepare and make a presentation about various VRM configurations and step motors found in literature • To be able to produce original ideas to come up with a beter VRM configurations by making brain storming activity on the operating principles of reviewed machines from the literature
Course Content	• Fundamentals of VRM Analysis. • Practical VRM Configurations. • Current Waveforms for Torque Production. • VRM Drives. • Nonlinear Analysis. • Performance Analysis of VRMs and VRM Drives by Software Simulations. • Loss, Efficiency and Torque Calculations. • Paper Reviews on the Subject. • Evaluation of Selected Studies Carried on Reviewed Papers by means of Software Simulations. • Step Motors. • Various Configurations of Step Motors. • Step Motor Control Methods and Step Motor Drives. • Paper Reviews on the Subject.

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Paper reviews on the subject	The relevant book chapters and materials from the literature
2	Fundamentals of VRM analysis.	The relevant book chapters and materials from the literature
3	Practical VRM configurations.	The relevant book chapters and materials from the literature
4	Current waveforms for torque production.	The relevant book chapters and materials from the literature
5	VRM drives, nonlinear analysis.	The relevant book chapters and materials from the literature
6	Loss, efficiency and torque calculations.	The relevant book chapters and materials from the literature

7	Performance analysis of VRMs and VRM drives by software simulations.	The relevant book chapters and materials from the literature
8	Step motors, various configurations of step motors, operating principles	The relevant book chapters and materials from the literature
9	Step motor control methods and step motor drives.	The relevant book chapters and materials from the literature
10	Evaluation of Selected Studies Carried on Reviewed Papers by means of Software Simulations	The relevant book chapters and materials from the literature
11	MIDTERM EXAM	
12	Evaluation of Selected Studies Carried on Reviewed Papers by means of Software Simulations	The relevant book chapters and materials from the literature
13	Evaluation of Selected Studies Carried on Reviewed Papers by means of Software Simulations	The relevant book chapters and materials from the literature
14	Student presentations on the reviewed literature and about the simulations made	The relevant book chapters and materials from the literature
15	Student presentations on the reviewed literature and about the simulations made	The relevant book chapters and materials from the literature
16	FINAL EXAM	

SOURCES	
Lecture Notes	Lecture notes and slides
Other Sources	**Course Textbook:** "Electrical Machinery", Fitzgerald, 5th Edition, 1992, McGraw Hill Int. Lmtd . **Additional Materials:** 1) "Theory and Application of Step Motors", Kuo, B.C., West Publishing, St. Paul, MN, 1974. 2) ACSL Programı ve Programlama Kılavuzu. 3) Konu hakkında yapılan yayınlar.

COURSE MATERIALS SHARING	
Documents	Lecture notes and slides
Homeworks	Students will be given at least total of 7 analytical or simulation homeworks
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
MIDTERM	1	30
Homework	7	35
FINAL EXAM	1	35
TOTAL		100

Course Category	
Sciences and Mathematics	50%
Engineering	50%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS							
No	Program Qualifications	Contribution Level					
		1	2	3	4	5	
1	Skills of using Mathematical, Science and Engineering Knowledge in Advanced Research					**x**	

2	Skills of analyzing, designing and/or implementing an original system which will solve an Engineering Problem					**x**
3	Skills of using software, hardware and modern measurement instruments for advanced research in one's field of expertise					**x**
4	Skills of planning, detailing and doing independent research					**x**
5	Skills of following literature, making and/or listening technical presentation, writing academic level article					**x**
6	Skills of finding original ways by means of innovative thinking and questioning					**x**

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out-of-class Study Time (Pre-study, practice)	16	5	90
Internet search, library work, literature search	16	3	48
Homework	7	13	91
Midterm	1	15	15
Final Exam	1	20	20
Total Work Load			312
Total Work Load / 30			312/30
Course ECTS Credit			10