

ROBOTICS AND INTELLIGENT SYSTEMS MASTER PROGRAM
COURSE SYLLABUS

Course Details				
Code	Academic Year			Semester
RIS505	1			1
Title	T	A	L	ECTS
Finite Elements Analysis	3	0	0	7
Language	English			
Level	Undergraduate		Graduate x	Postgraduate
Department / Program	Robotics and Intelligent Systems			
Forms of Teaching and Learning	Face-to-face			
Course Type	Compulsory		Elective x	
Objectives	Student will acquire the fundamental concepts of finite element analysis and will be introduced to finite element analysis tools			
Content	Differential Equations, Boundary Conditions, Integral Forms, Interpolation, Parametric Geometry, Numerical Integration, Matrix Algebra. Applications To Field Analysis, Stress Analysis And Vibrations.			
Prerequisites	-			
Coordinator	Dr. Öğr. Üyesi Mehmet Gökhan GÖKÇEN			
Lecturer(s)	Dr. Öğr. Üyesi Mehmet Gökhan GÖKÇEN			
Assistant(s)				
Work Placement				
Recommended or Required Reading				
Books / Lecture Notes	Finite Element Analysis Theory and Application with ANSYS, Saeed Moaveni, Prentice Hall 2008			
Other Sources	S. C. Chapra, R. P. Canale, Numerical Methods for Engineers, 3rd Ed. McGraw Hill, 1998. ANSYS Manual Sonlu Elemanlar Metodu, Azer A. Kasımzade, Birsen Yayınevi, 2004 Lecture Notes The Finite Element Method and Applications in Engineering Using ANSYS®, Erdogan Madenci and Ibrahim Guven, Springer, 2007			
Additional Course Material				
Documents				
Assignments				
Exams				
Course Composition				
Mathematics und Basic Sciences				%20
Engineering				%60

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Engineering Design		%20
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	35
Quiz		
Assignments	3	15
Attendance		
Recitations		
Projects	1	10
Final Exam		40
Total		100

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	6	84
Assignments	5	5	20
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory			
Projects	1	10	10
Final Exam	1	2	2
Total Work Load			174
ECTS Points (Total Work Load / Hour)			7

Learning Outcomes

1	to acquire fundamental concepts of finite element method
2	to know the structure of typical finite element packages (preprocessing, solution and post-processing)
3	to solve selected typical problems from engineering field using a software package

Weekly Content

1	Fundamentals of finite element method. Variational methods. Galerkin approach.
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2	Finite element discretization. Element types and shape functions
3	Direct method. Local element matrix, construction of global matrix and imposing boundary conditions.
4	Preprocessing: Modeling, meshing and boundary conditions.
5	Solution methods and post processing
6	Bending of beams
7	Axial Loading of a plate with center hole under tension
8	Axisymmetrical model of cylindrical pressure vessel
9	Conduction through an insulated wall
10	Heat transfer analysis combined with thermal stress analysis
11	Pipe flow
12	Cooling
13	Modal analysis of a beam
14	Project Presentations

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

Compiled by: Dr. Öğr. Üyesi Mehmet Gökhan GÖKÇEN

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