DEPARTMENT OF ROBOTICS AND INTELLIGENT SYSTEMS ENGINEERING

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 İntegration, 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 Lectute 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

DEPARTMENT OF ROBOTICS AND INTELLIGENT SYSTEMS ENGINEERING

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.**

DEPARTMENT OF ROBOTICS AND INTELLIGENT SYSTEMS ENGINEERING

2	**Finite element discritizatin. 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
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