FINITE ELEMENT ANALYSIS IN THERMOFLUIDS

1	Course Title:	FINITE ELEMENT ANALYSIS IN THERMOFLUIDS	
2	Course Code:	MAK5225	
3	Type of Course:	Optional	
4	Level of Course:	Third Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. İRFAN KARAGÖZ	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	Prof. Dr. Muhsin Kılıç mkilic@uludag.edu.tr Adres: Uludağ Üniversitesi Mühendislik-Mimarlık Fakültesi Ali Durmaz Makine Mühendisliği Binası DM:220 16059 Görükle/BURSA Tel: 0224 294 1953	
17	Website:		
18	Objective of the Course:	The aim of the course is to teach the basics of the finite element methods and its applications on the heat transfer and fluid flow applications.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Introduction of the basics of the finite element methods.
		2	Heat transfer analysis with FEM can be learnt.
		3	Fluid flow analysis with FEM can be learnt.
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21	Course Content:	
	Course Content:	
Week	Theoretical	Practice
1	Description of the basics of the finite element methods, basic concepts and definitions.	
2	Elements and shape functions: one dimensional elements.	

3	Elements and shape functions: multi dimensional elements.	
4	Element characteristics and formulation: Ritz method	
5	Element characteristics and formulation: Rayleigh-Ritz method	
6	The method of weighted residuals	
7	Repeating courses and midterm exam	
8	Formulation for the heat conduction equations	
9	Requirements for interpolation functions.	
10	Steady state heat conduction analysis	
11	Transient state heat conduction analysis	
12	Convection heat transfer: Governing equations, FEM formulations	
13	Convection heat transfer: Solutions algorithms, mesh structure and stability.	
14	Convection heat transfer: Laminar non-isothermal flow analysis.	

22	Textbooks, References and/or Other Materials:	1. J.N. Ready. Finite Element Method, McGraw-Hill, USA,1993. 2.R.W. Lewis, P. Nithiarasu, K.N. Seetharamu. Fundamentals of the Finite Element Method for Heat and Fluid Flow, Wiley, USA, 2004.

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	3.00	42.00
Homeworks	5	12.00	60.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	3.00	3.00
Others	5	15.00	75.00
Final Exams	1	3.00	3.00
Total Work Load			225.00
Total work load/ 30 hr			7.50
ECTS Credit of the Course			6.00

25	**CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS**															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	5	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High