

MM 594 Variational Methods in Mechanical Engineering				MECHANICAL ENGINEERING DEPARTMENT					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project/Field Study	Homework	Other	Total	Credit	ECTS credit
1,2	12	30				146	188	3	7.5
Language	Turkish								
Compulsory / Elective	Optional								
Prerequisites	-								
Course Contents	The concept of a functional. Variation as linear part of the increment of a functional. Necessary and sufficient conditions for the extrema of a functional. Variational principles corresponding to differential boundary-value problems. Canonical equations. Canonical transformations. Noether's theorem. Hamilton's principle for dissipative systems. Ritz method for multi-variable functions. Application to numerical analysis and finite element analysis.								
Course Objectives	Mechanics of deformable bodies involves the study of stress, strain, and temperature distribution in a solid or fluent body subjected to mechanical and termal loading.								
Learning Outcomes and Competences	Students are provided by the knowledge of formulation and analysis of the basic boundary/initial-value problems at the proper level of mathematical methods that enable them to understand the general underlying principles.								
Textbook and /or Reference	Lanczos, C., (1974). The Variational Prinsible of Mechanics. University of Tesonda Press. Reddy, J.N., (1986). Applied Functional Analysis and Variational Methods in Engineering. McGraw-Hill.								
Assessment Criteria					If any, mark as (X)		Percentage (%)		
	Midterm Exams				X		30		
	Quizzes								
	Homeworks								
	Projects								
	Term Paper								
	Laboratory Work								
	Other								
Final Exam				X		70			
Instructors									
Week	Subject								
1	The Concept Of Functional								
2	Variation as Linear Part of The Increment of a Functional								
3	Variation as Linear Part of The Increment of a Functional								
4	Necessary and Suffiient Condition for the Extrama of a Function								
5	Variational Principles Corresponding to Differantial Boundary Value Problems								
6	Variational Principles Corresponding to Differantial Boundary Value Problems								
7	Canonical Equations								
8	Canonical Transformations								
9	Noether's Theorem								
10	Hamilton's Principle for Dissipative System								
11	Hamilton's Principle for Dissipative System								
12	Ritz Method for Multi-Variable Functions								
13	Application to Numerical analysis and Finite Element Analysis								
14	Application to Numerical analysis and Finite Element Analysis								