Course Title	**Linear Static and Dynamic Finite Element Analysis of Solids**				
Course Code	**MME 451**				
Course Type	Technical Elective Course				
Level	Undergraduate				
Year / Semester	4th year / 7th or 8th Semester				
Teacher's Name	Vasileios Vavourakis				
ECTS	6	Lectures / week	3 hours	Laboratories / week	1 hour
Course Purpose and Objectives	This course aims to introduce the students to the realm of solid mechanics and structural analysis using the Finite Element Method (FEM). In addition to the theory, the students will attend laboratory workshops on a commercially available FEM software.				
Learning Outcomes	The present course has in its core a two-fold learning outcome; the students will: • Obtain fundamental theoretical knowledge in computational mechanics – with special emphasis in solid mechanics. • Gain experience utilizing a commercial FEM software: ABAQUS. Thus, the students will develop their capacity to: • Design and construct 2D and 3D finite element models in linear elastostatic problems. • Design and construct 2D and 3D finite element models in linear elastodynamic problems. • Evaluate and analyze the numerical results using FEM. • Develop their critical thinking towards assessing, improving and correcting their finite element models.				
Prerequisites	MME 317, MME 257	Required	None		
Course Content	The material of this rather introductory course in finite elements identifies two major parts: (a) the simulation and analysis of linear elastostatic boundary value problems, in two and three dimensions respectively, and (b) the modelling of transient (time-dependent) solid mechanics problems and the modal finite element analysis of structures. In summary, this course covers essential material in computational solid mechanics using FEM for final year undergraduates and postgraduates in mechanical engineering, bioengineering and civil engineering. Students will also receive hands-on training on commercially available finite element software through laboratory workshops. Throughout these workshops, the students will develop representative 3D FEM models to simulate quasi-static and transient problems in linear elasticity. The course also contains laboratory sessions to provide hands-on experience in ABAQUS.				

Teaching Methodology	• Class lectures (PowerPoint, Socrative, Screencast-o-matic) • Laboratory lectures – hands-on practice at the School computing center. • Communicative, Collaborative • During the first week of the semester, the course syllabus is given to students, which includes information on the course content, expected learning outcomes, assessment and office hours.
Bibliography	• Zienkiewicz, O.C. and R.L. Taylor. *Finite Element Method: Vol.1*. ISBN-13: 978-0750650496. • Hughes, T.J.R., *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*. ISBN-13: 978-0486411811. • Bathe, Klaus-Jürgen, *Finite Element Procedures*. ISBN-13: 978-0979004957. • Logan, D.L., *A First Course in the Finite Element Method*. ISBN-13: 978-0495668251. • Bonet J. and Wood R.D., *Nonlinear continuum mechanics for finite element analysis*. ISBN-13: 978-0521838702.
Assessment	• Assignments (x5) 60 • Final Exam 20 • Course project 30 For perfect grade the students need 100 points out the total 110.
Language	Greek