

Course Title	Numerical Methods				
Course Code	MME 307				
Course Type	Compulsory				
Level	Undergraduate				
Year / Semester	3 rd Year / 5 th Semester				
Teacher's Name	Triantafyllos Stylianopoulos				
ECTS	6	Lectures / week	3 hours	Laboratories / week	1 hour
Course Purpose and Objectives	Students should be able to, program in FOTRAN and Matlab, numerically solve problems on ordinary and partial differential equations (initial value and boundary value problems), compute numerical integrals and derivatives.				
Learning Outcomes	<ul style="list-style-type: none"> • Perform numerical differentiation and integration. • Solve a single or a set of Ordinary Differential Equations with the established pertinent numerical methods. • Solve Ordinary Differential Equations of higher order (2nd or higher derivative). • Use the finite differences method to solve a Partial Differential Equation in one and two dimensions. • Combine the finite differences method with a time-integration method to solve a time-dependent Partial Differential Equation. • Program efficiently in FOTRAN and Matlab. 				
Prerequisites	MME 208	Required	None		
Course Content	This course is an introduction to numerical methods for the solution of real engineering problems. Topics covered include numerical integration and optimization and solution of ordinary and partial differential equations (ODEs and PDEs). Methods that are used for the solution of ODEs include the Implicit and Explicit Euler method, the Runge-Kutta methods and the Adams-Bashforth-Moulton methods. The solution of PDEs is performed with the finite difference method in one and two-dimensions. Both steady state and time-dependent problems are solved. The course also covers a brief introduction to the finite element method. It includes a programming component for writing algorithms for the numerical solutions in FORTRAN and Matlab.				
Teaching Methodology	<ul style="list-style-type: none"> • 2 weekly lectures • 1 weekly computer lab session • Weekly homework problems • Communicative, Collaborative • During the first week of the semester the students receive the course syllabus, which includes the course content, bibliography, learning outcomes, assessment and office hours. 				
Bibliography	<ul style="list-style-type: none"> • Fausett, L.V., <i>Applied numerical analysis using Matlab</i>. • Fausett, L.V., <i>Numerical Methods: Algorithms and Applications</i>. • Rao, S.S., <i>Applied numerical methods for engineers and scientists</i>. 				

Assessment	<ul style="list-style-type: none">• Homework assignments 10%• Midterm exam 30%• Final exam 60%
Language	Greek