Course Title	Numerical Analysis				
Course Code	ECE240				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	To introduce the student to basic concepts and results from the numerical analysis area and apply the gained knowledge to practical problems which can be solved using MATLAB.				
Learning Outcomes	Upon successful completion of the course, students will be able to: • Use direct and iterative methods to solve linear systems of equations as well as be able to choose the most appropriate method for each problem. • Solve non-linear equations using iterative methods. • Approximate the eigenvalues and eigenvectors of a matrix using numerical methods. • Discuss the effect of floating-point arithmetic errors and numerical errors to the results obtained from a computer aided solution. • Approximate definite integrals with numerical quadrature. • Use MATLAB and its toolboxes to solve various problems.				
Prerequisites	MAT150, MAT160	Co-requisites	None		
Course Content	MATLAB fundamentals (GUI, mathematical operations, build-in functions, graphics) Programming with MATLAB (m-files, input and output, structure programming) Floating point arithmetic and error analysis (roundoff error, truncation error, total numerical error) Root finding (graphical approach, bracketing methods, fixed point iteration, Newton-Raphson method, secant method, MATLAB functions fzero and roots) Linear Systems (solving with MATLAB, Cramer's rule, Gaussian elimination, matrix inversion, LU-factorisation, Cholesky factorisation, Jacobi's method, Gauss-Seidel method, MATLAB functions lu, chol and fsolve) Eigenvalues and eigenvectors (mathematical background, the power method, MATLAB function eig) Numerical integration (introduction and background, trapezoidal rule, Simpson's rule)				
Teaching Methodology	Face- to- face				

<table>
<tr><td>Bibliography</td><td>Steve C. Chapra, Applied Numerical Methods with MATLAB, 4th Ed., McGraw-Hill, 2018

Desmond J. Higham and Nicolas J. Higham, MALTAB Guide, 3rd Ed., SIAM, 2017

William Bober, Introduction to Numerical Methods with MATLAB for Engineers and Scientists, CRC Press, 2014

Ramin S. Esfandiari, Numerical Methods for Engineers and Scientists Using MATLAB, 2nd Ed., CRC Press, 2017

Steve Otto and James P. Denier, An Introduction to Programming and Numerical Methods in MATLAB, Springer, 2005

Timmy Siauw and Alexandre Bayen, An Introduction to MATLAB® Programming and Numerical Methods for Engineers, Elsevier Science, 2014</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>70%</td></tr><tr><td>Assignments/Lab</td><td>20%</td></tr><tr><td>Class Participation and Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
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