COURSE NAME	Introduction to Numerical Mathematics					
Code	PMM108	Year of study	2.			
Course teacher	Milica Klaričić Bakula	Credits (ECTS)	5,0			
Associate teachers		Type of instruction (number of hours)	P	S	V	T
			30		30	
Status of the course	Compulsory	Percentage of application of e-learning	30			

COURSE DESCRIPTION	
Course objectives	The aim of this course is to introduce basic concepts and results in numerical analysis such as: approximation, numerical integration and differentiation, numerical solutions of linear and nonlinear equations. Students will gain preliminary knowledge for advanced courses in numerical analysis and get insight in modern trends where numerical methods, based upon sound computational mathematics, are the basic algorithms underpinning computer predictions in modern science.
Course enrolment requirements and entry competences required for the course	Enrolment requirements: *Introduction to algebra with analythic geometry*, Diferential and integral calculus I Entry competences: matrix, differential and integral calculus.
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Upon successful completion of this course students will be able to: - demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems - apply numerical methods to obtain approximate solutions to mathematical problems - derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations - analyse and evaluate the accuracy of common numerical methods.
Course content broken down in detail by weekly class schedule (syllabus)	- Introduction: Preliminaries and error analysis (1) - Function evaluation; Horner's scheme. Complete Horner's scheme (1) - Solving linear systems; Gaussian elimination; LU factorization; LU factorization with pivoting (2) - Numerical properties of Gaussian elimination; Cholesky decomposition; Iteration methods (2) - Orthogonal polynomials and their properties (1) - Lagrange interpolation; Newton interpolation; Hermite interpolation (3) - Linear spline; Cubic spline (2) - Least squares approximation; Minimax approximation (4) - Numerical integration: Newton-Cotes formulae; Midpoint rule; Trapezoidal rule; Simpson's rule; Romberg integration (2) - Gaussian quadrature (2) - Rootfinding for nonlinear equations: The bisection method; The secant method; Regula falsi (2) - Newton's method; Methods of higher order (2) - Fixed point iteration (2) - Numerical solutions of nonlinear systems of equations (2) - A chosen topic (2)
Format of instruction	Lectures and exercises.
Student responsibilities	Attending classes. Working individually through exercises, in addition to group work during classes.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Attending classes: 2 ECTS. Partial exams: 2 ECTS Final exam: 1 ECTS.
Grading and evaluating student work in class and at the final exam	Two partial written exams / one final written exam and final oral exam. Written and oral exams are equally evaluated in the final grade.
Required literature (available in the library and via other media)	1. V. Hari at all, Numerička analiza, PMF, Zagreb, 2003., skripta 2. M. Klaričić Bakula, Uvod u numeričku matematiku, PMFST, 2009., predavanja 3. R. Scitovski, Numerička matematika, Odjel za matematiku Sveučilišta u Osijeku, 2004., skripta
Optional literature (at the time of submission of study programme proposal)	1. K. Atkinson, An Introduction to Numerical Analysis, John Wiley, New York, 1989. 2. D. Kincaid and W. Cheney, Numerical Analysis, Brooks & Cole PC, Pacific Grove, 1990. 3. R. Burden & J. D. Faires, Numerical Analysis, Brooks & Cole PC, Pacific Grove, 2011.
Quality assurance methods that ensure the acquisition of exit competences	Summary feedback for the whole class after the exam. Anonymous student survey.
Other (as the proposer wishes to add)	