

COURSE GUIDE – short form

Academic year

Course name ¹	Numerical analysis assisted by computer					Course code			
Course type ²	DI	Category ³	DID	Year of study	II	Semester	2	Number of credit points	3

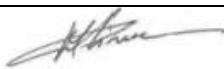
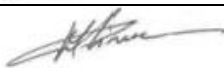
Faculty	of Mechanical Engineering	Number of teaching and learning hours ⁴						
Field	Mechanical Engineering	Total	L	T	LB	P	IS	
Specialization	bachelor	76	28		28		20	

Pre-requisites from the curriculum ⁵	Compulsory	<i>Not requested</i>
	Recommended	<i>Not requested</i>

General objective ⁶	The course will familiarize students with the main numerical methods that can be used while solving some problems met in mathematical modelling of physical phenomena.
Specific objectives ⁷	<p>Course:</p> <ul style="list-style-type: none"> - Errors and their sources in computer programming - Linear equations systems: choosing the method based on system's matrix type: symmetric, positive-definite, other type. - Creating the algorithm for solving a linear equation system. - Creating the algorithm for solving a nonlinear equation system, through a fix-point problem. - Determine the approximate value of a function at some point, using different interpolation methods. - Determining the length, surfaces or volumes using numerical integration methods; - Determining the position of a mobile point knowing its velocity (solving the Cauchy problem); <p>Applications:</p> <ul style="list-style-type: none"> - describing the algorithms for solving the above problems and using MATLAB for creating the problems. - analyzing and interpreting the errors; - drawing graphs in different contexts and reading the graphs
Course description ⁸	<p>I - Floating point representation of numbers and error theory elements</p> <p>II - Linear equations systems : Frobenius matrices and solving the systems using Gauss's method</p> <p>III - Systems having positive - definite matrix; Cholesky's method</p> <p>IV - Arbitrary linear equations systems: orthogonal matrices, Householder method.</p> <p>V - Matrix norms. Iterative methods for solving linear equations systems.</p> <p>VI - Iterative methods for solving linear equations systems. Relaxation methods</p> <p>VII - Conjugate gradient method. The least square method.</p> <p>VIII - Nonlinear equations systems. Successive approximations method</p> <p>IX - Nonlinear equations systems.. Newton-Raphson method</p> <p>X - Eigenvalues and eigenvectors. Interpolating functions. Lagrange interpolation polynomial</p> <p>XI - Interpolation of functions using cubic spline functions</p> <p>XII - Numerical integration</p> <p>XIII - Numerical solving of Cauchy's problem - unipas methods</p> <p>XIV - Numerical solving of Cauchy's problem - multipas methods</p>

Assessment		Schedule ⁹	Percentage of the final grade (minimum grade) ¹⁰
Continuous assessment	Class tests along the semester	week 8	30%
	Activity during tutorials/laboratory		%

	works/projects/practical work			
	Assignments		weeks 1-14	10%
Final assessment	Final assessment form ¹¹	colloquium	week 14	60%
	Examination procedures and conditions: 1. problems; 3 tasks; working conditions creating programs on computer ; percent of the final grade 100 %			

Course organizer	Lect. dr. Panțiruc Marian Dumitru	
Teaching assistants	Lect. dr. Panțiruc Marian Dumitru	

¹Course name from the curriculum

² DF – fundamental, DID – in the field, DS – specialty, DC – complementary (from the curriculum)

³ DI – imposed, DO –optional, DL – facultative (from the curriculum)

⁴ Points 3.8, 3.5, 3.6a,b,c, 3.7 from the Course guide – extended form (L-lecture, T-tutorial, LB-laboratory works, P-project, IS-individual study)

⁵ According to 4.1 – Pre-requisites - from the Course guide – extended form

⁶ According to 7.1 from the Course guide – extended form

⁷ According to 7.2 from the Course guide – extended form

⁸ Short description of the course, according to point 8 from the Course guide – extended form

⁹ For continuous assessment: weeks 1 – 14, for final assessment – colloquium: week 14, for final assessment-exam: exam period

¹⁰ A minimum grade might be imposed for some assessment stages

¹¹ Exam or colloquium