Course Description		
Course title:	Differential equations	
Neptun code:	GEMAN500M	
Status: core, specialization, optional, other:	core	
Type : lecture/seminar (practical)	2l+1p.	
Number of credits; hours per week	4; 3	
Name and position of lecturer:	Dr. Péter Varga, associate professor	
Contact of lecturer:	matvarga@uni-miskolc.hu	
Prerequisite course(s):		
Language of the course:	English	
Suggested semester: autumn /spring, 1-6	s, 2	
Requirements (exam/practical mark/signature/report, essay)	practical mark	
Course objectives (50-100 words):	The theory of differential equations is a basic tool of diverse fields of science. Students of this course should be able to understand the behaviors and to derive solutions of differential equations. The analysis of differential equations includes numerical, geometrical and analytical methods. The course covers linear and nonlinear, and also ordinary and partial differential equations. Nonlinear equations are studied by their linearization around the equilibrium solution. A short introduction to complex functions is presented. Laplace and Fourier methods are applied both to ordinary and partial equations.	
Course content:	**Week**	**Topic**
	1.	Geometric interpretation and numerical solution, Euler method.
	2.	Error estimation of numerical methods. Solution by Taylor series.
	3.	Solutions' qualitative behavior. Linearization.
	4.	Solution of linear ODE. Eigensystems of matrices.
	5.	Matrix exponentials, Jordan decomposition.
	6.	Complex functions, Cauchy formula.
	7.	Laplace transform.
	8.	Inhomogeneous linear differential equations. Frequency and impulse responses.
	9.	Heat equation, conservation laws.
	10.	Special solutions of partial differential equations. Plane waves.
	11.	Wave equation.
	12.	Laplace equation.
	13.	Calculus of variations, finite element methods.
Required readings:	Paul Dawkins: Differential Equations (free textbook, http://tutorial.math.lamar.edu/Classes/DE/DE.aspx) MIT OCW: Honors Differential Equation 18.034 http://mit.ocw.edu/courses/mathematics	
Recommended readings:	Peter Olver: Introduction to Partial Differential Equations, Springer, 2013.	
Assessment methods and criteria:	Tests, quizzes, final exam. A 40% overall score is required to pass the course.	