

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:	<table border="1"> <thead> <tr> <th>Week</th> <th>Topic</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Geometric interpretation and numerical solution, Euler method.</td> </tr> <tr> <td>2.</td> <td>Error estimation of numerical methods. Solution by Taylor series.</td> </tr> <tr> <td>3.</td> <td>Solutions' qualitative behavior. Linearization.</td> </tr> <tr> <td>4.</td> <td>Solution of linear ODE. Eigensystems of matrices.</td> </tr> <tr> <td>5.</td> <td>Matrix exponentials, Jordan decomposition.</td> </tr> <tr> <td>6.</td> <td>Complex functions, Cauchy formula.</td> </tr> <tr> <td>7.</td> <td>Laplace transform.</td> </tr> <tr> <td>8.</td> <td>Inhomogeneous linear differential equations. Frequency and impulse responses.</td> </tr> <tr> <td>9.</td> <td>Heat equation, conservation laws.</td> </tr> <tr> <td>10.</td> <td>Special solutions of partial differential equations. Plane waves.</td> </tr> <tr> <td>11.</td> <td>Wave equation.</td> </tr> <tr> <td>12.</td> <td>Laplace equation.</td> </tr> <tr> <td>13.</td> <td>Calculus of variations, finite element methods.</td> </tr> </tbody> </table>	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.
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Required readings:	<p>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</p>																												
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.																												

CV

Name of lecturer:

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Academic title, year obtained:

Department, contact:

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Languages: English

German

other:.....

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Dr. Balázs Tóth

A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2



Dr. Gréta Gergely

A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2



Dr. György Kaptay

A1 A2 B1 B2 C1 C2

A1 A2 B1 B2 C1 C2

A1 A2 B1 B2 C1 C2

Dr. Tamás Kékesi

A1 A2 B1 B2 C1 C2

A1 A2 B1 B2 C1 C2

A1 A2 B1 B2 C1 C2

Dr. Péter Varga

	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2

	Dr. Ferenc Mogoródy					
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2

	Dr. János Lukács					

A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2

Dr. Tamás Mende					
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2

Dr. Béla Török					
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
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Dr. György Czél

A1 A2 B1 B2 C1 C2

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A1 A2 B1 B2 C1 C2

A1 A2 B1 B2 C1 C2

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Dr. Gabriella Zsoldos

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A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2

Dr. Kálmán Marossy					
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2

Dr. Mariann Kollár					
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2
A1	A2	B1	B2	C1	C2

Dr. Pál Tóth					

	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2
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Dr. Árpád Bence Palotás						
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2

Dr. Péter Barkóczy						
	A1	A2	B1	B2	C1	C2
	A1	A2	B1	B2	C1	C2
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Dr. György Krállics						

A1	A2	B1	B2	C1	C2
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Dr. Sándor Kovács					
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Dr. Dániel Molnár					

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Dr. Valéria Mertinger						
	A1	A2	B1	B2	C1	C2
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Dr. Péter Baumli						
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Dr. Olivér Bánhidi						

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