

Study program : Mathematics			
Type and level of studies: Master academic studies			
<b>Course unit: Numerical Analysis 2</b>			
<b>Teacher in charge : dr Tatjana Tomović, Assistant Professor</b>			
Language of instruction: English			
ECTS: 10			
Prerequisites: Numerical Mathematics, Numerical Analysis 1			
Semester: <i>Summer Semester</i>			
<b>Course unit objective</b>			
The course offers an introduction to numerical solutions to ordinary differential equations, elliptic, hyperbolic and parabolic partial differential equations and integral equations.			
<b>Learning outcomes of Course unit</b>			
The student will obtain a solid introduction to the theory of numerical methods for ordinary differential equations, partial differential equations and integral equations (with derivations of the methods and some proofs). They will learn to implement the computational methods efficiently in Mathematica.			
<b>Course unit contents</b>			
<i>Theoretical classes</i>			
<b>Ordinary differential equations (boundary problems)</b> Shooting method. Finite Difference Method. Finite Element Methods. Ritz method. Galerkin method. Colocation.			
<b>Partial differential equations</b> Classification of PDEs. Numerical solution of partial elliptic, hyperbolic and parabolic equations. Finite Difference method.			
<b>Integral equations</b> The Numerical Solution of Fredholm integral equations. Determinant method. Successive kernels method. Degenerate kernels.			
<i>Practical classes</i>			
The application of theoretical knowledge to solve problems. Implementation of the computational methods in Mathematica.			
<b>Literature</b>			
<ul style="list-style-type: none"> <li>• Gordon C. Everstine, Numerical solution of Partial Differential Equations, 2010.</li> <li>• E. Hairer, S.P. Norsett, G. Wanner, Solving Ordinary Differential Equations I, Second Revised Edition, 1993, 1987 Springer-Verlag Berlin Heidelberg</li> <li>• Endre Suli, David Mayers, An Introduction to Numerical Analysis, Cambridge University Press, 2003</li> <li>• Mark S. Gockenbach, Mathematica Tutorial, SIAM, 2010.</li> <li>• Yury V. Shestopalov, Yury G. Smirnov, Integral Equations, Karlstad, 2002.</li> <li>• <a href="http://www.math.mtu.edu/~msgocken/pdebook2/mathtut2.pdf">http://www.math.mtu.edu/~msgocken/pdebook2/mathtut2.pdf</a></li> </ul>			
<b>Number of active teaching hours</b>			<b>Other classes</b>
Lectures: 60	Practice: 45	Other forms of classes	
<b>Teaching methods</b>			
<b>Examination methods ( maximum 100 points)</b>			
<b>Exam prerequisites</b>	<b>No. of points:</b>	<b>Final exam</b>	<b>No. of points:</b>
Student's activity during lectures	<b>4</b>	oral examination	<b>50</b>
practical classes/tests	<b>46</b>	written examination	
Seminars/homework		.....	
Project			
Other			
<b>Grading system</b>			
<b>Grade</b>	<b>No. of points</b>	<b>Description</b>	
<b>10</b>	<b>91-100</b>	Excellent	

<b>9</b>	<b>81-90</b>	Exceptionally good
<b>8</b>	<b>71-80</b>	Very good
<b>7</b>	<b>61-70</b>	Good
<b>6</b>	<b>51-60</b>	Passing
<b>5</b>	<b>0-50</b>	Failing

**(Table 5.2) Course unit description**