COURSE NAME	**Topics in applied mathematics**						
Code	PMM918	Year of study	2nd year of graduate study				
Course teacher	Nikola Koceić Bilan	Credits (ECTS)	6 ECTS				
Associate teachers		Type of instruction (number of hours)	L	S	E		
			30		30		
Status of the course	ELECTIVE COURSE	Percentage of application of e-learning	30%				
COURSE DESCRIPTION							
Course objectives	Introduce students to Sobolev spaces and their basic properties. Demonstrate how the abstract results from functional analysis can be applied to solve differential equations.						
Course enrolment requirements and entry competences required for the course	Passed courses Measure and Integral, Normed Spaces						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Student should be abel to: 1. explain the motivation for Sobolev spaces and their basic properties; 2. determine variational formulation for boundary value problem; 3. determine relationship among strong and weak solution; 4. relate compact operators in Hilbert spaces and Sturm-Liouville problems; 5. develop maximum principle for selected boundary value problems.						
Course content broken down in detail by weekly class schedule (syllabus)	1. Sobolev Spaces: Weak differentiation, Definition and Elementary Properties. Embedding Therems, The Space W_0^{1,p}. (4 weeks) 2. Hilbert Spaces: Elementary Properties, The Theorems of Stampacchia and Lax-Milgram. Compact Operators and Spectral Decomposition (2 weeks) 3. Some Examples of Boundary Value Problems in One Dimension: Variational Formulation, Regularity of Weak Solution, Maximum Principle (2 weeks) 4. Elliptic Boundary Value Problems: Variational Formulation, Regularity of Weak Solution, Maximum Principle, Eigenfunctions and Spectral Decomposition, Galerkin Approximations (3 weeks) 5. Evolution Problems: Heat Equation, Wave Equation (3 weeks)						
Format of instruction	Lecture and exercises.						
Student responsibilities	Attend class regularly and take notes. Take exams when scheduled.						
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 class: 2 ECTS** **Written exam: 2 ECTS** **Oral exam: 2 ECTS**						
Grading and	The final exam consists of a written and an oral part. Successful written exam is						

evaluating student work in class and at the final exam	required for taking the oral exam. Acceptable results achieved in midterm exams taken during the semester replace the written part of the exam. At student request, if it is possible, written exam may be replaced by project.
Required literature (available in the library and via other media)	H. Brezis, *Functional Analysis, Sobolev Spaces and Partial Differential Equation*, Springer, 2011.
Optional literature (at the time of submission of study programme proposal)	1. G. Allaire, *Numerical Analysis and Optimization*, Oxford University Press, Oxford, 2007. 2. D. Gilbarg, N.S. Trudinger, *Elliptic Partial Differential Equations of Second Order*, Springer-Verlag 1983.
Quality assurance methods that ensure the acquisition of exit competences	Statistics of test results and student evaluation via anonymous questionnaires at the end of the course. The survey is conducted according to the rules of the University of Split.
Other (as the proposer wishes to add)	