<table>
<tr><td>COURSE NAME</td><td colspan="5">Operators on Normed Spaces</td></tr>
<tr><td>Code</td><td>PMM229</td><td>Year of study</td><td colspan="4">2nd year of graduate study</td></tr>
<tr><td>Course teacher</td><td>Marko Matić</td><td>Credits (ECTS)</td><td colspan="4">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td></td></tr>
<tr><td>30</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>compulsory</td><td>Percentage of application of e-learning</td><td colspan="4">30%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">The course objective is to introduce students to the fundamentals of the theory of bounded operators on normed spaces, and in particular on unitary spaces. The emphasis is on the spectral theory of bounded operators, hence the students are introduced first to the theory of Banach algebras and then to the main results about the spectrum of bounded operators. Finally, the students are also introduced to some results about compact operators.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Taken course Normed spaces.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">The student is able to:

Explain the importance of bounded operators on normed (Banach) spaces and in particular on unitary (Hilbert) spaces.

Define all special subclasses of bounded operators (e.g. positive operators, compact operators, finite rank operators, etc.) and illustrate each case with examples and/or counterexamples.

Define the notion of normed (Banach) algebra, the resolvent and spectrum of an element of a Banach algebra or the resolvent and spectrum of a bounded operator, and illustrate these notions with examples and/or counterexamples.

State the basic theorems about the spectrum of an element of a Banach algebra or about the spectrum of a bounded operator from some of the special subclasses.

Prove the stated theorems.

Apply the theorems to concrete examples.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule</td><td colspan="5">Bounded operators on unitary spaces: the adjoint of a bounded operator, positive operators, the polar decomposition of an operator (7 hours).

Normed algebras: Banach algebras, the spectrum, the spectral radius and the</td></tr>
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(syllabus)	Bounded operators: the spectrum of a bounded operator, the point spectrum, the continuous spectrum and the residual spectrum, the resolvent set and the resolvent of an operator (7 hours). Compact operators: compact operators on normed spaces, compact operators on Hilbert spaces, finite rank operators (7 hours). Compactness of some integral operators (4 hours).
Format of instruction	Class lectures and tutorial sessions.
Student responsibilities	Class and tutorial sessions attendance, solving homework problems, self-learning of prescribed material by using the obligatory and optional literature.
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)*	Class attendance 1 ECTS. Final exam 5 ECTS.
Grading and evaluating student work in class and at the final exam	Final written and oral exam. Positive grade of the written exam is required to take the oral exam. The written and oral exam are equally weighted in the final grade.
Required literature (available in the library and via other media)	E. Kreyszig, *Introductory functional analysis*, John Wiley and sons, New York, 1978. S. Kurepa, *Funkcionalna analiza*, Liber, Zagreb, 1992
Optional literature (at the time of submission of study programme proposal)	G. Bachman, L. Narici, *Functional analysis*, Dover Publications, New York, 2000. W. Rudin, *Functional analysis*, McGraw-Hill, New York, 1973.
Quality assurance methods that ensure the acquisition of exit competences	Anonymous student evaluations at the end of semestar according to the regulations of the University of Split.

Other (as the proposer wishes to add)	