(Table 5.2) Course unit description

<table>
<tr><td colspan="5">Study program: Mathematics</td></tr>
<tr><td colspan="5">Type and level of studies: Master academic studies</td></tr>
<tr><td colspan="5">Course unit: Graph Theory</td></tr>
<tr><td colspan="5">Teacher in charge: Bojana Borovićanin</td></tr>
<tr><td colspan="5">Language of instruction: English</td></tr>
<tr><td colspan="5">ECTS: 8</td></tr>
<tr><td colspan="5">Prerequisites: None</td></tr>
<tr><td colspan="5">Semester (Winter Semester or Summer Semester): Winter</td></tr>
<tr><td colspan="5">Course unit objective
Introduction to the concepts and theorems of graph theory, as well as some possibilities of its application. Enabling students to formulate and solve numerous problems in this field using graph theory techniques and methods.</td></tr>
<tr><td colspan="5">Learning outcomes of Course unit
The student has acquired the theoretical knowledge necessary to understand the problems in graph theory, including possible applications in mathematics, computer science, electrical engineering, natural sciences, and other fields. The student has mastered the skills and methods of research in this area.</td></tr>
<tr><td colspan="5">Course unit contents
Theoretical classes:
Basic concepts of graph theory. Incidence matrix and adjacency matrix. Walks, paths and graph connectivity. Application to the shortest path problem and Dijkstra's algorithm. Trees - more detailed approach. Cayley's theorem. Application to the join problem and Kruskal's algorithm. Euler's i Hamiltonian paths and contours. The Chinese postman problem and Fleury's algorithm. Vertex and edge graph connectivity. Graph coloring - a more detailed approach and applications. Chromatic polynomial of a graph. Planar graphs. Pairings in graphs. The employment problem and the Hungarian matching algorithm. Internal and external graph stability. Digraphs and transport networks.

Practical classes: Application of the acquired theoretical knowledge in solving problems.</td></tr>
<tr><td colspan="5">Literature
1. L. Beineke, R. Wilson, P. Cameron, Topics in Algebraic Graph Theory, Cambridge University Press, Cambridge, 2004.
2. B. Bollobas, Modern Graph Theory, Series: Graduate Texts in Mathematics, Vol. 184, Springer, New York, 1998.
3. D. Cvetković, M. Doob, H. Sachs, Spectra of Graphs, 3rd edition, Johann Ambrosius Barth Verlag, Heidelberg–Leipzig, 1995.
4. R. Diestel, Graph Theory, Series: Graduate Texts in Mathematics, Vol. 173, Springer, Berlin, Heidelberg, 2017.
5. D. West, Introduction to Graph Theory, Second Edition, Prentice Hall, 2001.</td></tr>
<tr><td colspan="4">Number of active teaching hours</td><td rowspan="2">Other classes:</td></tr>
<tr><td>Lectures:
3</td><td>Practice:
3</td><td>Other forms of classes:
0</td><td>Independent work:
0</td></tr>
<tr><td colspan="5">Teaching methods
Presentation and discussions, consultation with the professor, homework.</td></tr>
<tr><td colspan="5">Examination methods (maximum 100 points)</td></tr>
</table>

Exam prerequisites	No. of points	Final exam	No. of points
Practical classes		Written examination	
Tests	40	Oral examination	50
Homework	10	Other	
Seminars			
Project			

Grading system		
Grade	**No. of points**	**Description**
10	>= 91	Excellent
9	81-90	Exceptionally good
8	71-80	Very good
7	61-70	Good
6	51-60	Passing
5	<=50	Failing