

Program	Level		First cycle				
	Name of the program		Applied Mathematics, Theoretical Computer Science				
<b>COURSE</b>							
Course title	<b>Operations Research</b>						
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)			
AMAT 310	V	Mandatory course	5	3+2+0			
Lecturer							
Course Goals	Operations research concepts can be used as scientific bases in a decision-making process. Using appropriate mathematical objects complex systems can be described, they can be managed and improved using mathematical methods. Elements used to model problems using linear and integer programs as well as the methods for solving these programs are the focus of this course. Special attention is devoted to some classical problems such as transport and knapsack problems.						
Learning Outcomes	<p>After completing this course, students should demonstrate competency in the following skills:</p> <ul style="list-style-type: none"> <li>- Understand basic principles of mathematical models, phases of the mathematical modelling process, and different types of mathematical models;</li> <li>- Be able to construct linear or integer programs describing real-world problems;</li> <li>- Understand the concept used for the simplex algorithm, be able to apply the simplex algorithm, use duality theory and sensitive analyses;</li> <li>- Be able to formulate and solve some classical problems such as transport, knapsack, and assignment problems;</li> <li>- Understand basic terms in integer programming and be able to solve simple integer programs using branch and bound methods.</li> </ul>						
<b>COURSE CONTENT</b>							
<ul style="list-style-type: none"> <li>- Principals of mathematical modelling, phases of the mathematical modelling process, types of mathematical models.</li> <li>- Linear programs modelling, simplex algorithm, problems at the beginning, during, and at the end of the simplex algorithm.</li> <li>- Duality theory, weak and strong duality theorems.</li> <li>- Post-optimal analyses.</li> <li>- Transportation problem.</li> <li>- Assignment problem.</li> <li>- Integer programming modelling, primal and dual bounds, branch and bound method for simple problems.</li> <li>- Knapsack problem.</li> </ul>							
<b>LITERATURE</b>							
<p>[1] F.S. Hiller, G.J Lieberman: Introduction to Operations Research (9th ed.), McGraw-Hill, 2009.  [2] R. J. Vanderbei: Linear Programming: Foundations and Extensions, Springer, 2002.  [3] L. A. Wolsey: Integer Programming, John Wiley &amp; Sons, New York, 1998.  [4] T. Sottinen: Operations Research, 2009.  [5] R. Weber: Optimization, Lecture notes, 1998.  [6] D. Barković: Operacijska istraživanja, Osijek, 2002.  [7] T. Mateljan, Ž. Jurić, R. Turčinodžić: Osnove operacionih istraživanja, Univerzitet u Sarajevu, 2018.</p>							
<b>STUDENT WORKLOAD (hours in a semester)</b>							
Lectures	45	Exercises	30	Individual work	50	T o t a l	125
<b>GRADING</b>				<b>REMARKS</b>			
Criterion	Maximum	Minimum					

	points	points	
Midterm exams	45	22	
Project	10		
Final exam	45	22	
T o t a l	100	55	