Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Operations Research
Course code	42134
Scientific sector	MAT/09
Degree	Bachelor in Industrial and Mechanical Engineering
Semester	II
Year	II
Academic year	2016-2017
Credits	6
Modular	*No*

Total lecturing hours	36
Total lab hours	
Total exercise hours	24
Attendance	Recommended
Prerequisites	Familiarity with linear algebra
Course page	-

Specific educational objectives	This course belongs to the "area di apprendimento di base" and it is part of the curriculum for the specialization in Logistics and Production Engineering. The scientific area is mathematics, informatics and statistics. The course gives a general overview of the main characteristics of a decision process. It aims at introducing students to the use of quantitative methods and techniques for effective decision-making. In particular, it will provide tools and skills to formulate and to solve mathematical models that represent real-world problems.

Lecturer	*Dr. Valeria Leggieri,* *office: Building K room K2.14,* *e-mail: valeria.leggieri@unibz.it,* *office phone: 0471-017136*
Scientific sector of the lecturer	MAT/09
Teaching language	English
Office hours	18 during the course.
Teaching assistant *(if any)*	-
Office hours	-
List of topics covered	The course will cover the following topics: 1. Introduction to Operations Research 2. Linear Programming models 3. Simplex algorithm 4. Duality theory

	5. Mixed-integer linear programming 6. Branch and Bound and Cutting plane algorithms 7. Network flow optimization (minimum cost flow, shortest paths, maximum flow, minimum spanning tree) 8. Nonlinear optimization Practice exercises will be carried out in EXCEL and LINDO environment.
Teaching format	Frontal lectures, exercises. Lecture materials will be available on the reserve collection.

Learning outcomes	**Knowledge and understanding** 1. To know and understand the basic concepts and the methods in the management science. 2. To know and understand how to formulate a problem, to construct a mathematical model and a solution method, and to validate the model. **Applying knowledge and understanding:** 3. To be able to formulate an optimization problem 4. To be able to solve an optimization problem with an appropriate method possibly using software tools. **Making judgements:** 5. To be able to interpret relevant model parameters. **Communication skills:** 6. Ability to structure and prepare a presentation on a specific network flow problem. **Learning skills:** 7. Ability to autonomously extend and use the knowledge acquired during the study course by reading and understanding scientific and technical documentation

Assessment

Summative assessment

Form	%	Length /duration	ILOs assessed
Written exam – exercises	70%	5 or 6 exercises (3 hour)	2, 3, 4, 5
Oral exam – theory	10%	Discussion of the written exam	1, 2, 5
Presentation of a project*	20%	Resolution of a problem of case studies using an optimization software + 15 minutes of group presentation	1-7

Prerequisite to pass to the oral exam is a written mark of at least 51/100.

	*Not attending students will have to answer an additional theoretical question during the oral exam.
Assessment language	English
Evaluation criteria and criteria for awarding marks	

Form	Evaluation criteria and weight
Written exam – exercises	Theoretical knowledge needed (30%) Correctness of solutions (30%) Correctness of methods (40%)
Oral exam – theory	Theoretical knowledge (40%) Ability to establish relationships between topics (40%) Mastery of specific language (20%)
Presentation of a project	Understanding of project goals (20%) Ability to work in team (10%) Correctness and impact of the project output (50%) Mastery of specific language (20%)

Required readings	Hillier, Lieberman "Introduction to Operations Research" McGrawHill
Supplementary readings	