

# Syllabus

## *Course Description*

<b>Course Title</b>	Quantitative Methods in Management
<b>Course Code</b>	30190
<b>Course Title Additional</b>	
<b>Scientific-Disciplinary Sector</b>	STAT-04/A
<b>Language</b>	German
<b>Degree Course</b>	Bachelor in Tourism, Sport and Event Management
<b>Other Degree Courses (Loaned)</b>	
<b>Lecturers</b>	Dott. Benjamin Weißing, Benjamin.Weissing@unibz.it <a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/35796">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/35796</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	Second semester
<b>Course Year/s</b>	3
<b>CP</b>	6
<b>Teaching Hours</b>	36
<b>Lab Hours</b>	-
<b>Individual Study Hours</b>	-
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	This course introduces students to essential quantitative techniques for informed decision-making in management. It covers foundational concepts in data analysis and optimisation (including linear and integer programming), with an emphasis on practical application. Students will gain experience using software tools such as Python to model and interpret quantitative problems.
<b>Course Topics</b>	<ul style="list-style-type: none"><li>- linear-, integer-, and nonlinear programming, multiple objective optimisation</li><li>- graph theory and networks</li><li>- project-planning</li></ul>

	<ul style="list-style-type: none"> <li>- statistics and probability</li> <li>- stochastic models</li> <li>- regression and predictive modelling</li> <li>- time series analysis</li> <li>- decision theory and utility modelling</li> </ul>
<b>Keywords</b>	optimisation, statistics, mathematical modelling, decision-making
<b>Recommended Prerequisites</b>	Basic knowledge in linear algebra and statistics.
<b>Propaedeutic Courses</b>	
<b>Teaching Format</b>	Synchronous, in-person lecture and exercises.
<b>Mandatory Attendance</b>	-
<b>Specific Educational Objectives and Learning Outcomes</b>	<p>ILO (Intended Learning Outcomes)</p> <p>ILO 1 - Knowledge and understanding</p> <p>ILO 1.1 The concept of uncertainty and the basic elements of probability theory.</p> <p>ILO 1.2 The fundamentals of linear programming in economics and management.</p> <p>ILO 1.3 The fundamentals of order theory, in particular partial and total (linear) order relations.</p> <p>ILO 1.4 The effects of non-total order relations on decision models</p> <p>ILO 2 – Ability to apply knowledge and understanding</p> <p>ILO 2.1 Formally define economic problems; find (optimal) solutions based on existing theories and interpret results.</p> <p>ILO 2.2 Use mathematical tools to analyse static and dynamic models.</p> <p>ILO 2.3 Mathematical problems and models as well as ideas for solving them.</p> <p>ILO 2.4 Use mathematical tools to analyse static and dynamic models with multiple variables.</p> <p>ILO 2.5 Use algorithms/applications to solve linear programmes and their dual problems.</p> <p>ILO 2.6 Solve zero-sum games between two people using linear programming.</p> <p>ILO 2.7 Solve linear programmes for business problems: cost and revenue optimisation, logistics design and optimisation, inventory flow planning, etc.</p> <p>ILO 2.8 Use mathematical methods to model risks (uncertainties)</p>

	<p>and solve expected utility maximisation problems.</p> <p>ILO 2.9 Distinguishing between decision situations with complete and incomplete preferences and then using the appropriate model.</p> <p><b>ILO 3 - Making judgements</b></p> <p>ILO 3.1 Identify the most important variables to be used in decision-making in complex situations.</p> <p>ILO 3.2 Report analytically and critically on information, empirical values and data in order to make adequate business decisions.</p> <p>ILO 3.3 Select the most appropriate quantitative and qualitative analysis tools to support decision-making.</p> <p>ILO 3.4 Find necessary additional information in databases, legal documents and scientific sources;</p> <p>ILO 3.5 Find solutions by using logical conclusions and combining information and analytical tools</p> <p><b>ILO 4 - Communication skills</b></p> <p>ILO 4.1 The educational activities in the first year include courses in all three official languages of instruction, covering communication and presentation strategies and techniques, as well as the acquisition of various skills for the cultural environment related to language. The second year includes a language course in a fourth language. Case studies, projects and exercises within the courses, as well as the written exams at the end of each course, also contribute to the development of students' communication skills.</p> <p>ILO 4.2 The achievement of this objective is assessed by means of written exams, group work, homework assignments, the presentation of case studies and projects, and the final thesis.</p> <p><b>ILO 5 - Learning skills</b></p> <p>ILO 5.1 the ability to retrieve and utilise information from databases, research studies, legal texts, regulations and standards that are required in their professional life;</p> <p>ILO 5.2 the ability to analyse, critically evaluate and integrate data, information and experience;</p> <p>ILO 5.3 the ability to develop possible solutions to problems in economic and operational areas relating to those work contexts that represent potential career prospects for graduates.</p>
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<b>Specific Educational Objectives and Learning Outcomes (additional info.)</b>	
<b>Assessment</b>	<p>Written final exam with open questions concerning the topics from the lecture (ILO 1-5).</p> <p>Same exam for attending and non-attending students.</p>
<b>Evaluation Criteria</b>	Correctness and comprehensibility of the answers given in the final exam.
<b>Required Readings</b>	<ul style="list-style-type: none"> <li>Canela, Miguel Ángel; Alegre, Inés; Ibarra, Alberto. <b><i>Quantitative Methods for Management: A Practical Approach.</i></b> Cham: Springer Nature Switzerland, 2019. ISBN 978-3-030-17554-2 (eBook).</li> <li>Bankhofer, Udo. <b><i>Quantitative Unternehmensplanung: Mathematische Methoden und betriebliche Anwendungsbeispiele.</i></b> Wiesbaden: Springer Fachmedien Wiesbaden, 2022. ISBN 978-3-8348-2466-0 (eBook).</li> <li>Werners, Brigitte. <b><i>Grundlagen des Operations Research: Mit Aufgaben und Lösungen.</i></b> 3rd edition. Berlin/Heidelberg: Springer Gabler, 2013. ISBN 978-3-642-40102-2 (eBook).</li> </ul>
<b>Supplementary Readings</b>	
<b>Further Information</b>	
<b>Sustainable Development Goals (SDGs)</b>	Quality education