

Valid from 2025.HS

Module description: Machine Learning I		
Module Code	w.BA.XX.3ML1-WIN.XX	
ECTS Credits	6	
Language of Instruction/Examination	English	
Module Description	Machine learning is more than a buzzword. The aim of this module is to introduce students to the set of rigorous statistical techniques that goes under the name of supervised machine learning. You will learn how to extract information from data, how to build and evaluate models, and how to make educated predictions about trends and random phenomena. Some lessons may be online and asynchronous.	
Organizational Unit	Institut für Wirtschaftsinformatik	
Module Coordinator	Pasquale Cirillo	
Deputy Module Coordinator	Elena Gavagnin	
Program and Specialization	<ul style="list-style-type: none"> <li>Business Information Technology - Specialization in Data Science</li> </ul>	
Legal Framework	Academic Regulations BSc dated 29.01.2009, for the degree programs in Business Administration, International Management, Business Information Technology, Business Law, Business Law and Applied Law, first adopted on 12.05.2009	
Module Category	<b>Module Type</b> Compulsory	<b>Program Phase</b> Main Study Period
Prerequisite Knowledge	<ul style="list-style-type: none"> <li>Basic calculus.</li> <li>An understanding of basic statistical concepts, including mean, variance, and correlation.</li> <li>While some knowledge of R or Python may be an advantage, it is not a requirement.</li> </ul>	
Contribution to Program Learning Objectives (by the concerned Module)	<ul style="list-style-type: none"> <li>Professional Competence</li> <li>Methodological Competence</li> <li>Social Competence</li> <li>Self-Competence</li> </ul>	
Contribution to Program Learning Objectives	<p><b>Professional Competence</b></p> <ul style="list-style-type: none"> <li>Knowing and Understanding Content of Theoretical and Practical Relevance</li> <li>Apply, Analyze, and Synthesize Content of Theoretical and Practical Relevance</li> <li>Evaluate Content of Theoretical and Practical Relevance</li> </ul> <p><b>Methodological Competence</b></p> <ul style="list-style-type: none"> <li>Problem-Solving &amp; Critical Thinking</li> <li>Scientific Methodology</li> <li>Work Methods, Techniques, and Procedures</li> <li>Information Literacy</li> <li>Creativity &amp; Innovation</li> </ul> <p><b>Social Competence</b></p> <ul style="list-style-type: none"> <li>Written Communication</li> <li>Oral Communication</li> <li>Teamwork &amp; Conflict Management</li> <li>Intercultural Insight &amp; Ability to Change Perspective</li> </ul> <p><b>Self-Competence</b></p> <ul style="list-style-type: none"> <li>Self-Management &amp; Self-Reflection</li> <li>Ethical &amp; Social Responsibility</li> <li>Learning &amp; Change</li> </ul>	
Module Learning Objectives	<p>Students...</p> <ul style="list-style-type: none"> <li>understand the theoretical framework of supervised machine learning.</li> <li>can fit supervised ML models to different types of data.</li> <li>can judge the quality and the goodness-of-fit of a supervised ML model.</li> <li>know how to implement basic supervised learning models in R/Python.</li> <li>learn some basic yet fundamental heuristics of machine learning.</li> </ul>	

## Module description: Machine Learning I

Module Content	<ul style="list-style-type: none"><li>• What is machine learning? What is supervised machine learning? What can be learned?</li><li>• The KNN algorithm.</li><li>• Linear regression.</li><li>• Data issues and basics of data engineering</li><li>• Generalized linear models (GLM).</li><li>• Decision trees and random forests.</li><li>• Support vector machines.</li><li>• Basics of time series analysis.</li><li>• Some hints about unsupervised machine learning.</li></ul>																																							
Links to other modules	This module is linked to the following modules: <ul style="list-style-type: none"><li>• w.BA.XX.3ML2-WIN.XX</li><li>• w.BA.XX.2MLVIJA.XX</li></ul>																																							
Digital Learning Resources	<ul style="list-style-type: none"><li>• Reader</li><li>• Teaching Materials</li><li>• Practice and Application Exercises (with Key)</li></ul>																																							
Methods of Instruction	<ul style="list-style-type: none"><li>• Lecture</li><li>• Literature Review</li><li>• Explorative Learning</li><li>• Exercises</li></ul>			Social Settings Used: <ul style="list-style-type: none"><li>• Individual Work</li></ul>																																				
Type of Instruction	<table><tr><th></th><th>Classroom Instruction</th><th>Guided Self-Study</th><th colspan="2">Autonomous Self-Study</th></tr><tr><td>Large Class</td><td>32 h</td><td>-</td><td colspan="2"></td></tr><tr><td>Small Class</td><td>24 h</td><td>-</td><td colspan="2"></td></tr><tr><td>Group Instruction</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Practical Work</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Seminar</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Total</td><td>56 h</td><td>0 h</td><td colspan="2">124 h</td></tr></table>						Classroom Instruction	Guided Self-Study	Autonomous Self-Study		Large Class	32 h	-			Small Class	24 h	-			Group Instruction	-	-			Practical Work	-	-			Seminar	-	-			Total	56 h	0 h	124 h	
	Classroom Instruction	Guided Self-Study	Autonomous Self-Study																																					
Large Class	32 h	-																																						
Small Class	24 h	-																																						
Group Instruction	-	-																																						
Practical Work	-	-																																						
Seminar	-	-																																						
Total	56 h	0 h	124 h																																					
Performance Assessment	<table><tr><th colspan="2">End-of-module exam</th><th>Form</th><th>Length (min.)</th><th>Weighting</th></tr><tr><td colspan="2">Written exam</td><td>closed book</td><td>90</td><td>100.00</td></tr><tr><td colspan="2">Permitted Resources</td><td>Spec. calculator acc. to leaflet "Utilities"</td><td colspan="2">With dictionary</td></tr></table> <table><tr><th>Others</th><th>Assessment</th><th>Format</th><th>Length (min.)</th><th>Weighting</th></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>					End-of-module exam		Form	Length (min.)	Weighting	Written exam		closed book	90	100.00	Permitted Resources		Spec. calculator acc. to leaflet "Utilities"	With dictionary		Others	Assessment	Format	Length (min.)	Weighting	-	-	-	-	-										
End-of-module exam		Form	Length (min.)	Weighting																																				
Written exam		closed book	90	100.00																																				
Permitted Resources		Spec. calculator acc. to leaflet "Utilities"	With dictionary																																					
Others	Assessment	Format	Length (min.)	Weighting																																				
-	-	-	-	-																																				
Classroom Attendance Requirement	None  Attendance is highly recommended but not compulsory.																																							
Compulsory Reading	<ul style="list-style-type: none"><li>• All compulsory reading will be available on Moodle.</li></ul>																																							
Recommended Reading	<ul style="list-style-type: none"><li>• Dekking, F., Kraaikamp, C., Lopuhaä, H. &amp; Meester, L. (2005). A Modern Introduction to Probability and Statistics. 1st edition. Springer. ISBN 1852338962.</li></ul>																																							
Comments	The book by Dekking et al. (2005) is recommended as an additional resource for students who feel they would benefit from more statistical and probabilistic knowledge.																																							