Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Statistical Methods for Business Analysis
Code der Lehrveranstaltung	25559
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	SECS-S/01
Sprache	Englisch
Studiengang	Master in Unternehmensführung und Innovation
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Alessandro Casa, Alessandro.Casa@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/46549 dr. Giulia Bertagnolli, Giulia.Bertagnolli@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/49312
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Zweites Semester
Studienjahr/e	1
KP	6
Vorlesungsstunden	36
Laboratoriumsstunden	18
Stunden für individuelles Studium	-
Vorgesehene Sprechzeiten	18
Inhaltsangabe	This course begins with a review of key principles of statistical inference and then introduces core concepts in statistical learning. Topics include linear regression and its extensions, advanced

	regression techniques such as decision trees, logistic regression, classification methods, model selection strategies, and unsupervised learning approaches like principal component analysis and clustering. Throughout the course, students will work hands-on in R, applying techniques to real-world datasets drawn from business scenarios. By the end, students will be able to choose suitable statistical models, apply them to a range of business problems, and effectively communicate their analytical insights.
Themen der Lehrveranstaltung	- Überblick über die statistische Inferenz: Zufallsvariablen, Konfidenzintervalle und Hypothesentests. - Einführung in statistische Lernkonzepte: Grundlegendes Vokabular und Begriffe, parametrische und nichtparametrische Ansätze, Vorhersage- und Schlussfolgerungsziele, Verzerrungs-Varianz-Abgleich, überwachtes und unüberwachtes Lernen - Lineare Regression und Erweiterungen: einfache und multiple lineare Regression, Modellschätzung und -bewertung, Modellannahmen, Schlussfolgerungswerkzeuge, qualitative Prädiktoren, Interaktionseffekte, polynomiale Regression, Grundbegriffe der nichtparametrischen Regression - Klassifikation: Einführung in die Klassifikation, logistische Regression, Modellschätzung, Bewertung von Klassifikatoren - Andere überwachte Lerntechniken: Bäume, Splines, additive Modelle - Modellauswahl/-bewertung und Bewertung der Modellkomplexität: Resampling-Methoden, Kreuzvalidierung und Informationskriterien - Unüberwachtes Lernen: Clustering-Tools wie k-means und hierarchisches Clustering, Hauptkomponentenanalyse - Anwendungen mit der Software R
Stichwörter	statistical learning, regression, classification, clustering, dimensionality reduction, model selection
Empfohlene Voraussetzungen	No formal prerequisites are required. Nonetheless, knowledge of basic concepts in descriptive and inferential statistics is useful, and attending a pre-course in mathematics/statistics is recommended.
Propädeutische Lehrveranstaltungen	
Unterrichtsform	In-person lectures and computer labs. Whenever possible, lectures will be structured to prioritize in-class time for discussions, and practical applications.

Anwesenheitspflicht	
Spezifische Bildungsziele und erwartete Lernergebnisse	Knowledge and understanding The student acquires advanced knowledge and understanding of the models and instruments of economic-business analysis for the creation of a new company with particular attention to the identification of new market opportunities, the availability and procurement of economic-financial resources and technological and organisational skills for the development of the company The student acquires advanced knowledge and understanding of the models and tools of economic-business analysis for the management of a new enterprise, from the financial and organisational point of view and with respect to the dynamics of growth and development I/we acquire advanced knowledge and understanding of the theories and tools for the economic analysis of business decisions. I/we acquire knowledge and understanding of theories and tools for the economic analysis of the market, at the level of the individual enterprise and the supply system I/we acquire knowledge and understanding of the theories and tools of statistical analysis for making market forecasts I/we acquire knowledge of the legal forms required for setting up a company and for the legal protection of intellectual property rights I/we acquire advanced knowledge and understanding of models for new product development and innovation management within enterprises I/we acquire advanced knowledge and understanding of business analysis tools and solutions for the development of innovations and organisational knowledge I/we acquire advanced knowledge and understanding of innovation economics models and systems for regional innovation development The student acquires knowledge of quantitative models for the formulation of forecasts necessary to guide management decisions and to predict the life cycle of a product and a sector Ability to apply knowledge and understanding ability to acquire and select information that may be relevant from an entrepreneurial point of view, also in economic-productive contexts different from those studied ability to analyse the combination of market opportunities and

	resources of the enterprise and to identify entrepreneurial formulas, also with the elaboration of original, compatible and sustainable solutions and combinations ability to select business economics models, suitable for the appropriate analysis of a specific economic-social and productive context ability to assess the potential and sustainability of new business projects (business plan), from a multidisciplinary (economic, business and legal) perspective ability to assess the entrepreneurial potential associated with the development of an innovation by a company (learning area 2) ability to acquire and select relevant information to frame cases of innovation (product, service, social, managerial organisational), also different from the contexts studied Autonomy of judgement Acquire the ability to analyse complex entrepreneurial problems, such as the elaboration and evaluation of an entrepreneurial project (business plan) or the development of a new product. Acquire the ability to make predictions, such as analysing the future consequences of entrepreneurial, managerial and operational choices. Autonomy of judgement is developed in the training activities carried out for the preparation of the thesis, as well as in the exercises that accompany the lectures and that involve group discussions and the comparison of individual analyses carried out by students in preparation for the lecture. Communication skills Acquire the ability to describe and communicate in an intercultural context, in a clear and precise manner, problematic situations typical of the management of a new enterprise and the development of innovation, such as, for example, the conditions for the validation of a problem or solution, the prospects and risks associated with a business model or an innovation project. The development of communication competences assumes heterogeneous situations such as, for example, the presence of internal stakeholders (e.g. colleagues, managers, owners), or external stakeholders (e.g. potential investors, suppliers and other business partners) and the ability to sustain an adversarial process.

	The achievement of these objectives is assessed in the course of the training activities already mentioned, as well as in the discussion of the final thesis. Learning ability Acquire the ability to study independently, to prepare summaries. Acquire the ability to identify thematic connections and to establish relationships between different cases and contexts of analysis Acquire the ability to frame a new problem systematically and to generate appropriate taxonomies. Acquire the ability to develop general models from the phenomena studied.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	Assessment (for both attending and non-attending students): - Written Exam: Exercises and review questions (65% of the final grade). - Data Analysis Project: Group project in which students select and analyze an interesting dataset using the tools learned in the course. Groups will present their work at the end of the course (35% of the final grade; optional). Notes: - For students who do not complete the project, the written exam will count for 100% of the final grade. - Project grades remain valid for one academic year.
Bewertungskriterien	Written exam: understanding of statistical concepts, correct interpretation of results of statistical analyses, clarity and precision of explanations. Data Analysis Project: Quality and clarity of the presentation, adequacy and appropriateness of analyses with respect to dataset characteristics
Pflichtliteratur	James, G., Witten, D., Hastie, T., Tibshirani, R. An Introduction to Statistical Learning with Applications in R. Springer, 2013. Freely available at http://www- bcf.usc.edu/~gareth/ISL/

	Slides and lecture notes provided
Weiterführende Literatur	Bishop, C. M. (2006). *Pattern recognition and machine learning*. New York: Springer. Agresti, A., Finlay, B. Statistica per le scienze sociali, Pearson, 2009. Hyndman, R.J. and Athanasopoulos, G. Forecasting: principles and practice, 2nd edition, OTexts: Melbourne, 2018. Cicchitelli, Giuseppe. Statistica. Principi e metodi. Pearson, 2008. Azzalini, Adelchi, and Bruno Scarpa. Data analysis and data mining: An introduction. OUP USA, 2012. Grigoletto, Matteo, Laura Ventura, and Francesco Pauli. Modello lineare: teoria e applicazioni con R. G Giappichelli Editore, 2017. Johnson, Richard A., and Dean W. Wichern. "Applied multivariate statistical analysis." New Jersey 405 (1992).
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Gesundheit und Wohlergehen, Maßnahmen zum Klimaschutz, Weniger Ungleichheiten, Menschenwürdige Arbeit und Wirtschaftswachstum