LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

LMU MUNICH SCHOOL OF MANAGEMENT

Information Systems & Digital Business

AI for Managers

Winter Semester (annual rotation)

Institute:	Institute of AI in Management
Lecturer:	Prof. Dr. Stefan Feuerriegel
Assistant:	Assistants are annually changing
Weekly hours:	This is a block course with approximately five full days of lectures and exercises, plus two half days for Q&A, during the semester.
Credits	6
Examination:	We plan for an exam on site, in person.
Prerequisites:	Please note that we expect scripting skills (e.g., in Python), as students will apply their theoretical knowledge by implementing a machine learning application with given open-source packages. The exam will -- to large extent -- also include programming exercises. Please bring your own laptop to class.
Course Material:	All course materials will be shared via Moodle. Students are required to self-enrol to the course through Moodle. The self-enrolment key can be accessed via LSF.

Course Description & Main Objectives

Prior to the start of the Information Age in the late 20th century, companies were forced to collect data from non-automated sources manually. Companies back then lacked the computing capabilities necessary for data to be analysed, and as a result, decisions primarily originated not from knowledge but from intuition.

By the end of the course, students will be able to plan, implement and evaluate analytics in applied settings to generate value from data for society, corporations, and individuals. This serves the pressing need of firms to improve their efficiency – such as customer satisfaction, competitive advantage – by leveraging the growing amounts of structured and unstructured data.

To achieve this overall goal, students should after participation being able to:

Objective 1 (Managerial aspects):

Understand the processes and challenges of analytics-related projects

- Identify applications for analytics in corporations and organizations that create value
- List implications for management when undertaking a project involving business analytics
- Apply the data mining process CRISP-DM to their actual setting

Objective 2 (Methodological challenges):

Understand common methods for performing business analytics

- Translate use cases of business analytics into a mathematical model formulation
- Name common methods for business analytics, as well as their underlying concepts
- Compare the properties of these models

Objective 3 (Practical implementation):

Performing actual evaluations of business analytics based on real-word datasets

- Pre-process data to transform it into relational structures
- Apply statistical software (e.g., "R" or Python) to perform business analytics in practice
- Evaluate the results to choose the best-performing method

Lectures Overview / Course Outline

Unit 1: Introduction

- Organizational details
- Applications of business analytics

Unit 2: Predictive modeling

- Definition of machine learning
- Taxonomy of predictive modeling
- Performance assessments

Unit 3: Linear modeling

- Linear model (ordinary least squares)
- Regularization (lasso, ridge regression, elastic net)

Unit 4: Non-linear modeling

- Decision trees
- Random forest
- Boosting
- Neural networks

Unit 5: Model tuning

- Train/test split
- Cross-validation

Unit 6: Bringing machine learning to practice

- Management challenges
- Pitfalls in practice

Beyond the scope of the course: resampling, unsupervised learning (clustering), dimensionality reduction (principal component analysis), classifiers (support vector machine, AdaBoost, etc.)

Literature

James, Witten, Hastie & Tibshirani (2013): An Introduction to Statistical Learning: With Applications in R. *Springer*

Sharda, Delen & Turban (2014): Business Intelligence: A Managerial Perspective on Analytics. *Pearson*