LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

MUNICH INTERNATIONAL SUMMER UNIVERSITY

MUNICH MISU LMU INTERNATIONAL SUMMER UNIVERSITY

Machine Learning and Data Analytics in Finance and Accounting

July 22 - August 9, 2024

www.mda-misu.de

Objectives

- **Online: July 22 – July 27**
- **In-class in Munich: July 29 – August 9**

The Munich School of Management at LMU - one of the leading universities for Business Administration in Europe - offers a unique summer program for students from around the world. The course "Machine Learning and Data Analytics in Finance and Accounting" takes place in the heart of Munich.

An increasingly complex global business environment requires firms to make use of the large amounts of data out there in order to make better decisions. Machine learning allows to "automatically detect patterns in data, and then use the uncovered patterns to predict future data" (K. Murphy, Research Scientist at Google). It is rapidly developing and changing businesses as well as companies' financial processes. This opens up the possibility of using machine learning approaches to cope with complicated real-world financial problems.

Goals of the course

As a result of participating in this course, a student is expected to

- understand the goals and capabilities of machine learning,
- apply machine learning approaches to real-world financial problems, and
- use important data analytics methods to evaluate large data sets
- using an approachable, and well-known programming language, Python.

Content

This course aims at making you familiar with basic machine learning approaches and data analytics techniques by enabling you to use them to your professional benefit. Adopting a user perspective, you will learn to automate simple, but time-consuming tasks such as classification of analysts' conference calls into economically meaningful content.

Additionally, the course enables you to tackle complex prediction tasks using different information sources. For example, we will approach loan loss predictions or price and volume forecasts. Finally, the course gives you relevant data analytics skills such as the description, visualization and statistical analysis of such predictions. This is a hands-on class: We will use the programming language Python to apply the above concepts.

All essential programming skills are taught in this course and there are no prior programming skills required. **The course contains the following building blocks:**

1. **Introduction**

2. **Introduction to Python**
   - Python Basics for Data Science
   - Importing and cleaning data
   - Natural language processing

3. **Unsupervised Machine Learning**
   - Dimensionality reduction techniques (e.g. hierarchical clustering)
   - Analyzing stock market data with K-Means Clustering
   - Topic modelling using Latent Dirichlet Allocation

4. **Supervised Machine Learning**
   - Fraud detection and loan default classification using k-nearest neighbors algorithm and support vector classification
   - Support vector regression to predict market prices
   - Performance evaluation of the prediction model

5. **Data Analytics**
   - Data description and visualization
   - Statistical analysis of socio-economic data

Please see the schedule in detail on our website.

Academic Host

Institute for Accounting, Auditing and Analysis at the Munich School of Management at Ludwig-Maximilians-Universtität München

Patronage

Prof. Dr. Thorsten Sellhorn

Lecturer

Dr. Gereon Hillert

Gereon is a Manager in EY's Valuation, Modelling and Economics practice based in Munich, Germany. Further he is lecturer in the summer schools financial statement analysis and valuation and machine learning and data analytics.

- He studied business administration with majors in Accounting and Finance at Saint Mary's University Halifax, Canada, Goethe University Frankfurt, Universidad Viña del Mar, Chile and University of Bayreuth.
- Gereon is a Manager in EY's Valuation, Modelling and Economics (VME) practice based in Munich, Germany.
- Further, he got practical experience at Pwc AG, KPMG and Deutsche Bank AG in the areas of capital markets, M&A, financial due diligence and financial accounting.
- His current research interests include corporate learning and operating leverage decisions as well as disclosure policy choice and topic modelling using machine learning methods.

Dr. Andreas Woltschläger

Andreas is an Manager in PwC's valuation team based in Hamburg, Germany. Further he is lecturer in the summer schools financial statement analysis and valuation and machine learning and data analytics.

- He studied economics and business administration with majors in Accounting and Finance at the University Paderborn, University of Bayreuth, Ludwig-Maximilians-Universtität and University of Lancaster.
- Andreas is an Assistant Manager in KPMG Deal Advisory, Valuation team based in Hamburg, Germany.
- He got practical experience at Commerzbank AG, EY and Wincor Nixdorf AG in the areas of equity research, M&A, financial due diligence, valuation and group accounting.
- His current research interests include financial statement analysis, forecasting using machine learning techniques, business intelligence, corporate learning and valuation.

Course Requirements

General course requirements

The Academic Board of the LMU Munich defines the requirements and contact hours* for successful completion of the courses as follows:

- regular attendance (6 lessons max. absence)
- preparation for and active participation in seminars
- attendance and contribution to lectures
- participation in and contribution to class excursions
- self-study and homework assignments
- written assignments
- presentations

Course structure

The course takes place in the heart of Munich. Following a one week online preparation students participate on an intensive in-class program complemented by inspiring social and cultural activities.

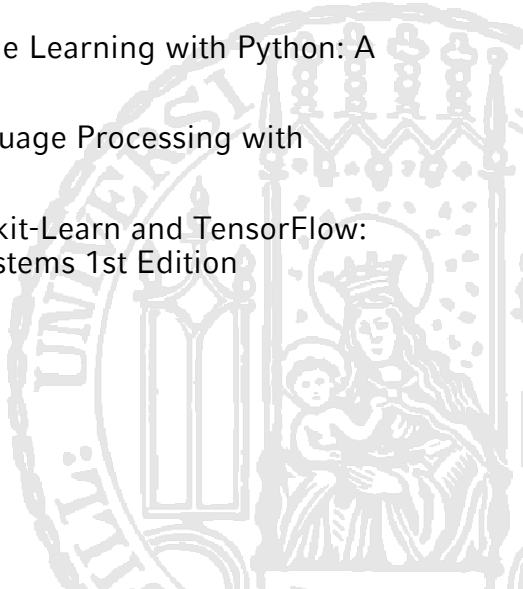
- Online: July 22 – July 27
- In-class in Munich: July 29 – August 9

Literature

Andreas C. Müller, Sarah Guido: Introduction to Machine Learning with Python: A Guide for Data Scientists, 1st Edition

Bird, Steven; Klein, Ewan; Loper, Edward: Natural Language Processing with Python, First edition, 2009

Géron, Aurélien: Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 1st Edition



Student Profile

Target group

We offer this program for Bachelor students, Masters students and young scientists as well as to support their successful placement in attractive fields of activity.

There are no prior programming skills required. However, an interest in numbers and logical relationships as well as a basic statistical knowledge are advantageous.

Prerequisites for participation are a good command of written and spoken English. Lectures, presentations and examinations will be held in English. Even though we do not require students to submit language test results, we urge students with poor language skills to abstain from applying. Knowledge of German is not a prerequisite.

Achievements

Former participants of the MISU Finance, Accounting and Economics programs have evaluated this program very positively and recounted their experience as follows:

- "The course itself was very nice organized and executed. Gereon and Andreas were extremely knowledgeable on the subject matter. They are very approachable for expert consultation"
- "Many thanks to our amazing teachers Dr. Gereon Hillert and Dr. Andreas Woltschläger!"
- "The course was an engaging way to understand technical concepts used in the industry I'm interested in and I'm thankful for my wonderful lecturers. It was a pleasure meeting my fellow course mates who hailed from all parts of the world and I enjoyed studying with them and learning from them throughout the program. Spending nearly a month in Munich was a fantastic experience as a whole and I'm glad I received the opportunity to experience German culture. I look forward to my next trip!"

Credits

Contact Hours*: 60 contact/class hours* worth up to 6 ECTS credits

- One contact/class hour comprises 45 minutes.

Credit Transfer

Most international colleges and universities accept credits from the MISU[LMU]. However, each institution has its own policy regarding credit acceptance from other institutions. We strongly recommend that students consult their academic adviser and/or professor to receive credit transfer approval before applying to the MISU Summer Academy. Students who would like to transfer credits to their home universities should print out all documents contact the professor or study abroad adviser and ask for credit and grade approval.

European Credit Transfer system (ECTS) and ECTS Credits

The ECTS was developed in order to provide common procedures that may guarantee academic recognition for studies abroad. ECTS credits are based on the workload students need in order to achieve expected learning outcomes. The ECTS (European Credit Transfer and Accumulation System) is a standard for comparing the academic level and performance of students in Higher Education across the European Union.

Students will be awarded 1 ECTS credit for 30 hours of work, including attending classes, self-study, examinations and essays. The following chart provides grading information:

LMU Grade	Description	Grade ECTS	US	US	Percentage
1.0	excellent	A	A+	4,0	100 – 97
1.0	very good	A	A	3,9	96 – 93
1,3	very good	A	A-	3,7	92 – 90
1.7	good	B	B+	3,5	89 – 87
2.0		B	B	3,3	86 – 83
2.3		B	B-	3,0	82 – 80
2.7	satisfactory	C	C+	2,7	79 – 77
3.0		C	C	2,3	76 – 73
3.3		D	C-	2,0	72 – 70
3.7	sufficient	E	D+	1,3	69 – 67
4.0		E	D	1,0	66 – 60
> 4.0	insufficient	F	E	0,0	59 – 0
NG	not graded	F		0,0	0

Grading

Grading Scale

Grades are defined from the Academic Board of the LMU in Munich according to its general grading system. The LMU differentiates 6 levels (from 1 to 6), which cover everything from introductory course work to original research. This course is offered for students having successfully completed levels 2 and 3.

Level	Description
1	Introductory course with intensive supervision; no course prerequisites; generally first year courses
2	Introductory course, independent study techniques included; no specific course prerequisites; generally second year courses
3	For advanced students, course prerequisites: successful completion of level 1 or 2; examinations test the students' ability to apply knowledge and insights to new problems; generally third year courses
4	Specialized course, course prerequisites: successful completion of level 2 or 3; extensive use of scientific articles; examination may include a small research project, an oral report or written work. This is a third year Bachelor's or first year Master's level course
5	Scientifically oriented course; course prerequisites: successful completion of level 3 or 4; use of scientific advanced literature. This is a Master's level course
6	Very advanced scientific course; latest scientific developments included; examinations consist of a contribution to an unsolved problem with an oral presentation; Master's or PhD level course

Grading Procedure

There are three grading sections in this course:
60% = Written Exam
30% = Oral presentation, homework assignments
10% = Active participation in class and soft skills

Transcripts

Every student will receive an official transcript after the successful completion of all program requirements. The transcript will show the course name and contact hours, the number of acquired credits as well as the achieved grades.

Fees & Payment

The course takes place one week online and two weeks in-class in Munich.

- Online: July 22 – July 27
- In-class in Munich: July 29 – August 9

Early bird registration fee: € 150.00 (until March 1, 2024)

Regular registration fee: € 300.00 (until May 1, 2024)

Tuition: € 1,050.00

Housing fee:

- € 310.00 (double room, with shower and toilet on each floor)
- € 370.00 (double room with shower and toilet)

The complete payment includes the following:

- academic program (60 contact hours in class, 6 ECTS credits
- course reading materials
- excursions: City Tour Munich, Castle Neuschwanstein
- mensa and cafeteria access
- internet access at the room
- internet access at the university
- library access
- tutors and emergency contact

Deadlines for payment

- **Early bird registration fee and tuition payment deadline:** immediately after receiving the e-mail with the admission letter (PDF), March 1, 2024 at the very latest.
- **Regular registration fee and tuition payment deadline:** immediately after receiving the e-mail with the admission letter (PDF), May 1, 2024 at the very latest.

Cancellation*

Cancellation before the registration deadline:

- The registration fee will not be refunded.
  All other deposits will be fully refunded.
- Cancellation after the registration deadline:
- The registration fee will not be refunded.
  If accommodation was booked, the rent will not be refunded or have to be paid.

Cancellation 4 weeks before commencement of the course:

- The registration fee will not be refunded.
  If accommodation was booked, the deposit for the rent will not be refunded and 50% of the tuition will not be refunded.

Cancellation 3 days before commencement of the course:

- The registration fee will not be refunded.
  If accommodation was booked, the deposit for the rent will not be refunded and 80% of the tuition will not be refunded.
- Once the course has started, no refund will be granted.

Cancellation by MISU

- All tuition and fees will be refunded.

* All bank charges are excluded from repayment.

Accommodation

Arrival

- July 29, 2024 (Check-in 02:00 p.m. - 7:00 p.m.)

Departure

- August 10, 2024 (Check-out 11:00 am)

Student Residence

The participants will reside in a student residences in the heart of Munich. The student housing facility is located three subway stations away from the classroom.

For more information, please see our program website.

Board

During your stay, you will be responsible to provide your own meals. You should count on spending approximately 15,00 € per day on food. During the week lunch can be purchased at one of the university's canteens for 5,00 - 8,00 €.

Registration

The selection of participants will be done continuously. The registration takes place on the 'first come, first serve'- principle, given that the application meets the requirements of the program.

In the interest of maintaining the program's high standards, the number of participants will be limited to 30. The application is based on a first come first served basis. The number of students from one university is limited to 4 to ensure an international character of the program.

The online registration starts on the November 1, 2023.

http://www.mda-misu.de/en/content/MDA_registration

Application materials for the MDA program:

- Curriculum vitae (CV): you may use the Euro Pass format if you do not have your own form: http://europass.cedefop.europa.eu
- Statement of motivation: Applicants should write a short statement of no more than one typed page in English as to why they wish to take part in the summer program.

Deadlines for the registration:

- **Early bird application deadline:** March 1, 2024
- **Regular application deadline**: May 1, 2024

Contact

Academic Contact

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Administration / Application Contact

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