

Data Science Summer School 2022

Introduction to Machine Learning for Engineering Sciences

4 – 8 July 2022, Leoben, Austria

The [summer school](#) is organized by the [Data Science Hub Leoben](#) at the [Montanuniversität Leoben](#) and [TU AUSTRIA](#). The goal is to introduce machine learning and its application in engineering and physical sciences. We welcome PhD, Master, and advanced Bachelor students for an intensive five days of lectures, workshops and networking.

The future importance of machine learning and data analytics is indisputable; it provides a means of creating added value from data. In the context of engineering, the data emanates from physical, chemical and mechanical systems and/or processes, which must obey the laws of physics. Consequently, a special branch of machine learning that incorporates models of these processes is required. Such model-based machine learning approaches enable the integration of dependencies, interactions and constraints which are essential for consistent, predictive and noise robust ML systems.

The summer school will give a general introduction to machine learning. This will include aspects such as: data preparation, representations for data, different ML architectures and quality assessment of learned solutions. There will be a focus on applications in the areas of: robotics, machine monitoring, and material science.

Date

Montanuniversität Leoben will host the summer school from **Monday, July 4th to Friday, July 8th, 2022.**

Expected arrival is Sunday, July 3th, 2022.

Application

If you are interested in participating in the summer school, please send your application to dshl@unileoben.ac.at. Please note that the number of participants is limited.

Application deadline: **Saturday, May 14th, 2022.**

Your application should include the following:

- Complete CV
- Motivation Letter: Please tell us why you want to participate and which related expertise and experience you have. Please mention any programming skills or other experiences with machine learning and related approaches.

We expect fluent English and an academic background in engineering or physical sciences.

Notification of Acceptance: May 31th, 2022

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Costs

Participation fee: €100

The participation fee includes:

- all course material and lecture notes
- coffee breaks
- social events

Travel- and accommodation costs need to be covered by the students individually.

Accommodation costs for the week will be around €200.

Please bring your own Laptop for the workshops.

Certificate

You will get a certificate of participation, also stating the number of hours worked. No ECTS points will be granted.

Contact Persons

Organizers

Prof. Dr. Peter Auer, auer@unileoben.ac.at

Administration

Andrea Eichelberger, dshl@unileoben.ac.at

	Sunday 3.7.	Monday 4.7.	Tuesday 5.7.	Wednesday 6.7.	Thursday 7.7.	Friday 8.7.
9:00-10:30		Intro ML: Performance measures, testing	Intro ML: Data preparation, CNNs	Information, knowledge and understanding	ML in Robotics	ML in material science
10:30-11:00		Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00-12:30		Introduction to Python for ML	Deep learning with Python	Autoencoders for physical systems	ML in Robotics	ML in material science
12:30-14:00		Lunch break	Lunch break	Lunch break	Lunch break	Lunch break
14:00-15:30		ML with Python workshop	Deep learning workshop	Excursion	Robotics workshop	Open lab
15:30-16:00		Coffee Break	Coffee Break		Coffee Break	Coffee Break
16:30-17:30		ML with Python workshop	Deep learning workshop	Dinner	Robotics workshop	Open lab
Evening	Welcome reception					

Schedule (tentative)

The week of this summer school will consist of morning lectures and afternoon hands-on workshops. It will cover foundational topics of machine learning and applications in various technical areas. We start with an optional get-together on Sunday evening and are also planning an outdoor excursion on Wednesday, which will conclude with dinner.

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Schedule

The week of the TU Austria Data Science Summer School 2022 will consist of morning lectures and afternoon hands-on workshops. It will cover foundational topics of machine learning and applications in various technical areas. We start with an optional get-together on Sunday evening and are also planning an outdoor excursion on Wednesday, which will conclude with dinner.

The expected arrival in Leoben, Austria is Sunday, July 3th 2022.

Monday, July 4th

09.00 AM – 10.30 AM Intro Machine Learning: Performance measures & testing

Coffee break

11.00 AM – 12.30 PM Introduction to Python for Machine Learning

Lunch break

2.00 PM – 5.30 PM Workshop: Machine Learning with Python
(incl. coffee break)

Tuesday, July 5th

09.00 AM – 10.30 AM Intro Machine Learning: Data preparation & CNNs

Coffee break

11.00 AM – 12.30 PM Deep Learning with Python

Lunch break

2.00 PM – 5.30 PM Workshop: Deep Learning
(incl. coffee break)

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Wednesday, July 6th

09.00 AM – 10.30 AM Information, knowledge & understanding

Coffee break

11.00 AM – 12.30 PM Autoencoders for physical systems

Lunch break

2.00 PM – open end Excursion

Dinner

Thursday, July 7th

09.00 AM – 12.30 PM Machine Learning in robotics (incl. coffee break)

Lunch break

2.00 PM – 5.30 PM Workshop: Robotics (incl. coffee break)

Friday, July 8th

09.00 AM – 12.30 AM Machine Learning in Materials Science (incl. coffee break)

Lunch break

2.00 PM – 5.30 PM Open lab (incl. coffee break)

All information given is subject to change.