



Course and Examination Fact Sheet: Spring Semester 2025

7,230 | 8,230: Introduction to Machine Learning and Deep Learning

ECTS credits: 4

Overview examination/s

(binding regulations see below)

central - Written examination, Analog, Individual work individual grade (100%, 90 mins.)

Examination time: Lecture-free period

Attached courses

Timetable -- Language -- Lecturer

[8,230,1.00 Introduction to Machine Learning and Deep Learning](#) -- English -- [Borth Damian](#) , [Gonon Lukas](#)

Course information

Course prerequisites

No prerequisites are required. Students will require a notebook for tutorials. A good background in mathematics, algorithms and data structures will be beneficial for this lecture.

Learning objectives

Artificial Intelligence (AI):

- Students know the definition of Artificial Intelligence (AI) with respect to strong AI and weak AI and its link to the Turing Test
- Students understand the relation between Artificial Intelligence, Machine Learning and Deep Learning and can differentiate between them
- Students understand the principles of Trustworthy AI,

Machine Learning (ML):

- Students know how a standard ML process can be setup, including best practice for training, validation, and test setups to prevent overfitting
- Students understand Evaluation Metrics of Classification and Retrieval
- Student can differentiate Supervised Learning & Unsupervised Learning

Deep Learning (DL):

- Students understand End-to-End learning as compared to traditional ML setups
- Students understand Neural Networks and the principles behind backpropagation
- Students know different deep neural networks architectures and its application domains
- Students understand Adversarial Attacks and Challenges to Trustworthy AI

Course content

The rise of Artificial Intelligence (AI) driven by the breakthrough of Deep Neural Networks has disrupted many industries over the last years. Driven by large investment in research and development at tech companies such as Google, Facebook and Amazon, the technology is turning into a key strategic element of every publicly listed company.

This lecture aims to introduce the concepts of Machine Learning (ML) and Deep Learning (DL) to the students. The goal is to provide an understanding of the basic concepts and approaches in both research areas, its relation to each other and impact to business and society.



Topics covered include:

- Machine Learning
- Importance of Data for Training
- Supervised learning
- Unsupervised learning
- Deep Learning and Neural Networks
- CNN, LSTM, Autoencoder
- Trustworthy AI

Course structure and indications of the learning and teaching design

Theoretical content presented in the lecture will be linked to practical applications in the lecture. In addition discussions about recent AI development and innovation potential will connect the topic to real-world events.

Course literature

- Goodfellow I, Benjo Y., Courville A., Courville A, Deep Learning, MIT Press, 2016

Additional course information

-

Examination information

Examination sub part/s

1. Examination sub part (1/1)

Examination modalities

Examination type	Written examination
Responsible for organisation	central
Examination form	Written exam
Examination mode	Analog
Time of examination	Lecture-free period
Examination execution	Synchronous
Examination location	On Campus
Grading type	Individual work individual grade
Weighting	100%
Duration	90 mins.

Examination languages

Question language: English
Answer language: English

Remark

--

Examination-aid rule

Closed Book

The use of aids is prohibited as a matter of principle, with the exception of pocket calculator models of the Texas Instruments TI-30 series and, in case of non-language exams, bilingual dictionaries without any handwritten notes. Any other aids that are admissible must be explicitly listed by faculty members in the paragraph entitled "Supplementary aids" of the course and examination fact sheet; this list is exhaustive.



Procuring any aids, as well as ensuring their working order, is the exclusive responsibility of students.

Supplementary aids

-

Examination content

All contents from lecture and exercise sessions, as well as referenced literature, on the following topics:

- Machine Learning
- Importance of Data for Training
- Supervised learning
- Unsupervised learning
- Deep Learning
- Neural Networks
- CNN, LSTM, Autoencoder
- Trustworthy AI

Examination relevant literature

- Provided lecture and exercise slides
- Exercise assignments
- Provided hand-outs
- Referenced literature
- Discussions during the lecture and exercise sessions

Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 13 (Monday, 25 March 2025) are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 23 January 2025);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 17 March 2025);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 14 (Monday, 31 March 2025);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before ending with de-registration period in CW 15 (Monday, 07 April 2025).

