UNIVERSITÄT BERN

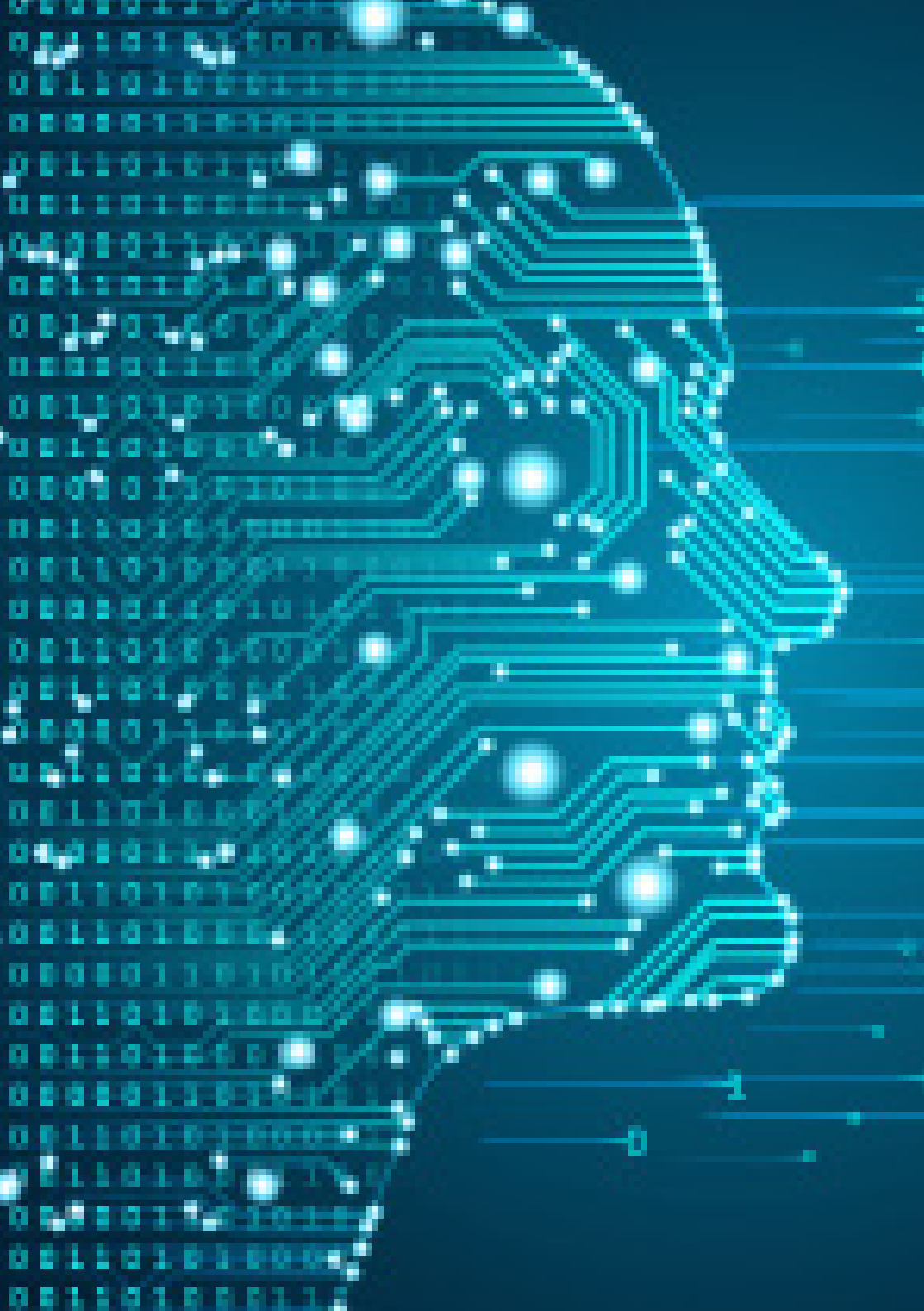
CAS
Natural Language Processing

Artificial Intelligence for Languages





Continuing Education in Extended Intelligence



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Natural Language Processing - AI for Languages

Introduction

From translating languages and answering questions to pulling out key information and even generating text, Natural Language Processing (NLP), especially NLP algorithms e.g. ChatGPT and others, are already a big part of our daily lives. But the latest advances in NLP, powered by cutting-edge models, go far beyond these familiar uses. These breakthroughs are opening up entirely new possibilities for how we interact with technology—hinting at systems that might one day understand meaning or even mimic aspects of human thought.

NLP is a fascinating field at the crossroads of language studies, artificial intelligence, and computer science. Thanks to deep learning techniques, tools in this area are now performing so well that they're transforming how we handle anything involving natural languages.

Our program dives into this exciting field, offering six modules between August and January. It's designed for professionals who want an overview of the NLP domain with focus on recent developments (like deep learning models) and who want to learn how to apply useful tools. Programming skills, machine learning experiences and mathematical background are not required as we offer a free preliminary course in Python and one in Mathematical Methods. The difficulty is at a university master level and assumes a higher education degree.

«When I was young, I found out that the big toe always ends up making a hole in a sock. So I stopped wearing socks.»

ALBERT EINSTEIN

Target Groups

Aimed at students and professionals from the public/private sector that hold a degree from a university or a university of applied sciences (e.g. BSc, MSc, PhD). Exceptions are possible. Are you a journalist, author, librarian, linguist, translator, lawyer, social media expert, media and communications specialist or similar? Then this CAS NLP it definitely for you!

SUITABLE AND INTENDED FOR PRACTITIONERS AND RESEARCHERS:

Gain an overview of the Natural Language Processing domain with a focus on recent developments (deep learning models) and hands-on learning. Learn the techniques behind e.g. ChatGPT and the tools for processing language & text with Artificial Intelligence.

Standard data sets are provided, but participants are encouraged to bring or acquire their own. Programming skills, machine learning experiences and mathematical background are not required as we offer a free preliminary course in Python.
If you have any questions regarding whether this program could work for you, please do not hesitate to contact us.

Objectives

Course competence is developed throughout six modules and a CAS project work. On completion, the graduates will

- Have an overview of the NLP domain and common applications
- Be able to perform relevant preprocessing tasks needed for advanced NLP
- Be able to understand neural networks and practice them on their own NLP applications
- Be able to understand transformers and practice transfer learning with transformers for their own applications
- Know discussions related to philosophical and ethical aspects around NLP and artificial intelligence
- Be familiar with active research in the NLP domain

CAS Natural Language Processing - AI for Languages
Summary

Degree
Certificate of Advanced Studies in Natural Language Processing NLP University of Bern (CAS NLP Unibe)

Scope
16 ECTS

Duration
August - July
(2 years is possible)

Start
Every August

Admission
A degree from an university or an university of applied sciences

Cycle
Annual

Language
English

Locations
All courses take place in walking distance from the Bern railway station. The exception is Module 3 which takes place in Italy at Lago Maggiore and Module 6, which takes place in the ski resort Mürren two train hours from Bern city.

All courses are additionally held online. Remote participation is possible (via Zoom).

Teaching methods
Our teaching methods are modern and peer oriented. The modules use online platforms with multimedia materials, tutorials and assessments to aid learning, along with classes for discussion, feedback and a chance to deepen knowledge. Main tool and language is Python.

Workload
Each module corresponds to approx. 20 hours of classroom time and at the end of each module there will be a module work (effort for classroom & work is in total 60 hours). Each complete module qualifies for 2 ECTS points. The expected workload for the final CAS Project (4 ECTS) is 120 hours.
1 ECTS point equals 30 hours of work.

Further information
www.unibe.ch/continuing_education_programs/cas_natural_language_processing (t.ly/2gh3a)

Modules

Module 1

NLP 1 (Fundamentals)

In this module, linguistics and machine learning concepts are introduced and an overview of the NLP field and common applications is given.

Module 2

NLP 2 (Preprocessing and basic analysis)

In this module, participants learn to perform basic preprocessing and analysis of natural language.

Module 3

Neural networks

In this module, participants learn how neural networks work, are trained, tuned, assessed and applied for NLP tasks

Module 4

Transformers

In this module, participants study transformers and learn why they have changed the NLP field.

Module 5

Philosophical and ethical aspects of NLP

In this module, participants study and discuss ethical and philosophical aspects related to machines being capable of natural language processing.

Module 6

Frontiers and applications

This module consolidates the knowledge obtained from previous modules to focus on prominent NLP topics and applications.

Final Project

CAS Thesis

Consolidate all gained knowledge in your final CAS Project. Team work and usage of own data are encouraged.

Final Project

Participants define and perform a 4 ECTS project work, individually or in teams during the CAS. Support is provided by the CAS lecturers. Output is a report, computational notebooks and a presentation. The use of own data from profession or research is encouraged.

To check if registration is currently possible, visit (t.ly/2gh3a)

Cost

Regular CAS program:	CHF 9900
Employees and students of the University of Bern:	CHF 6900

Inclusive of all modules, performance assessments, certificates, materials and teaching platforms, coffee breaks, full pension hotel (Module 3), full pension hotel in Mürren (Module 6) and diploma apero.

Participants must supply their own laptops.

Registration

Register via https://www.unibe.ch/continuing_education_programs/cas_natural_language_processing

Registration opens in November and a maximum of 20 registrations can be accepted each year. Registrations are processed in the order of arrival. The CAS can only be offered if there are sufficient registrations by the deadline.

Registered participants will receive acceptance confirmation by email and will be invited to one of the next Introduction events. Attendance to one Introduction is mandatory. Partcipants can cancel their registrations before the deadline without any costs. After the deadline the regulations apply. Individual modules and electives can be attended before the registration.

Schedule

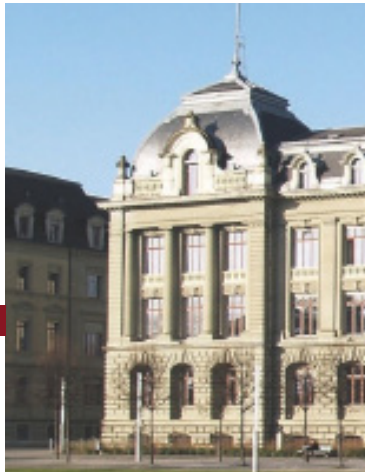
Module 1	NLP 1 (Fundamentals)	August: Week 34 (block of 4 mornings)
Module 2	NLP 2 (Preprocessing and basic analysis)	August: Week 35 (block of 4 mornings)
Module 3	Neural networks	October: Week 41 (block of 4 days)
Module 4	Transformers	Every Friday afternoon Oct. - Dec.: Week 43 - 50/51
Module 5	Philosophical and ethical aspects	Every Friday afternoon Oct. - Dec.: Week 43 - 50/51
Module 6	Frontiers and applications	January/February: Week 05 (in the next year, block of 4 days)

Further introductionary courses:

Algorithms and programming are important tools in data driven research. Python is a good scripting language widely used to make pipelines of tasks typical for large computations and analysis on large datasets. It suits the purpose of starting programming in it, as well.

For students who wish to refresh their Python programming knowledge or who are new to the Python programming language, we recommend completing our introductionary self-study pre-course on GitHub (https://github.com/dsl-unibe-ch/Introduction-to-Python).

We offer an online Python Q&A session in the week before course start (week 33).



CONTACT

PD Dr. Sigve Haug
Director of Studies
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Claire Dove
Education and
Communication Manager
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Lecturers

Our lectuers are local or external experts. Currently, lecturers include

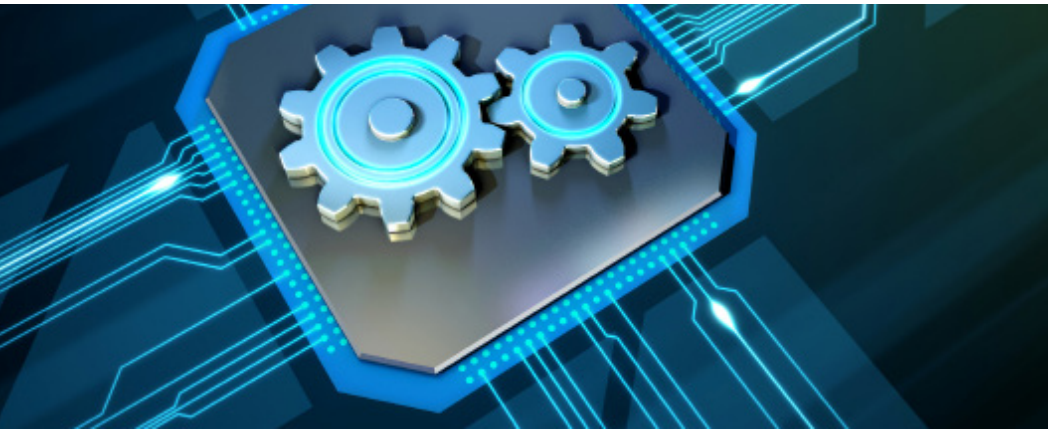
- Prof. Dr. Dr. Claus Beisbart
- Dr. Christa Schneider
- PD Dr. Sigve Haug
- Dr. Mykhailo Vladymyrov
- Dr. Sukanya Nath
- MA Ahmad Alhineidi
- Martin Ritzmann
- et al.

Program management

The Certificate of Advanced Studies (CAS) in Natural Language Processing (NLP) is offered by the Mathematical Institute in Continuing Education.

- Prof. Dr. Jan Draisma (Chair)
- PD Dr. Sigve Haug (Director of Studies)
- Prof. Dr. Paolo Favaro
- Prof. Dr. Tobias Hodel
- Prof. Dr. Christiane Tretter
- Prof. Dr. Thomas Wihler

Further Studies:
Extended Intelligence



DAS Extended Intelligence

The CAS Natural Language Processing (NLP) can be combined with the CAS Advanced Machine Learning (AML) into a Diploma of Advanced Studies in Extended Intelligence - the DAS XI. Instead of the CAS NLP one can choose the CAS Applied Data Science (ADS).

The scope of the DAS XI comprises 38 ECTS:

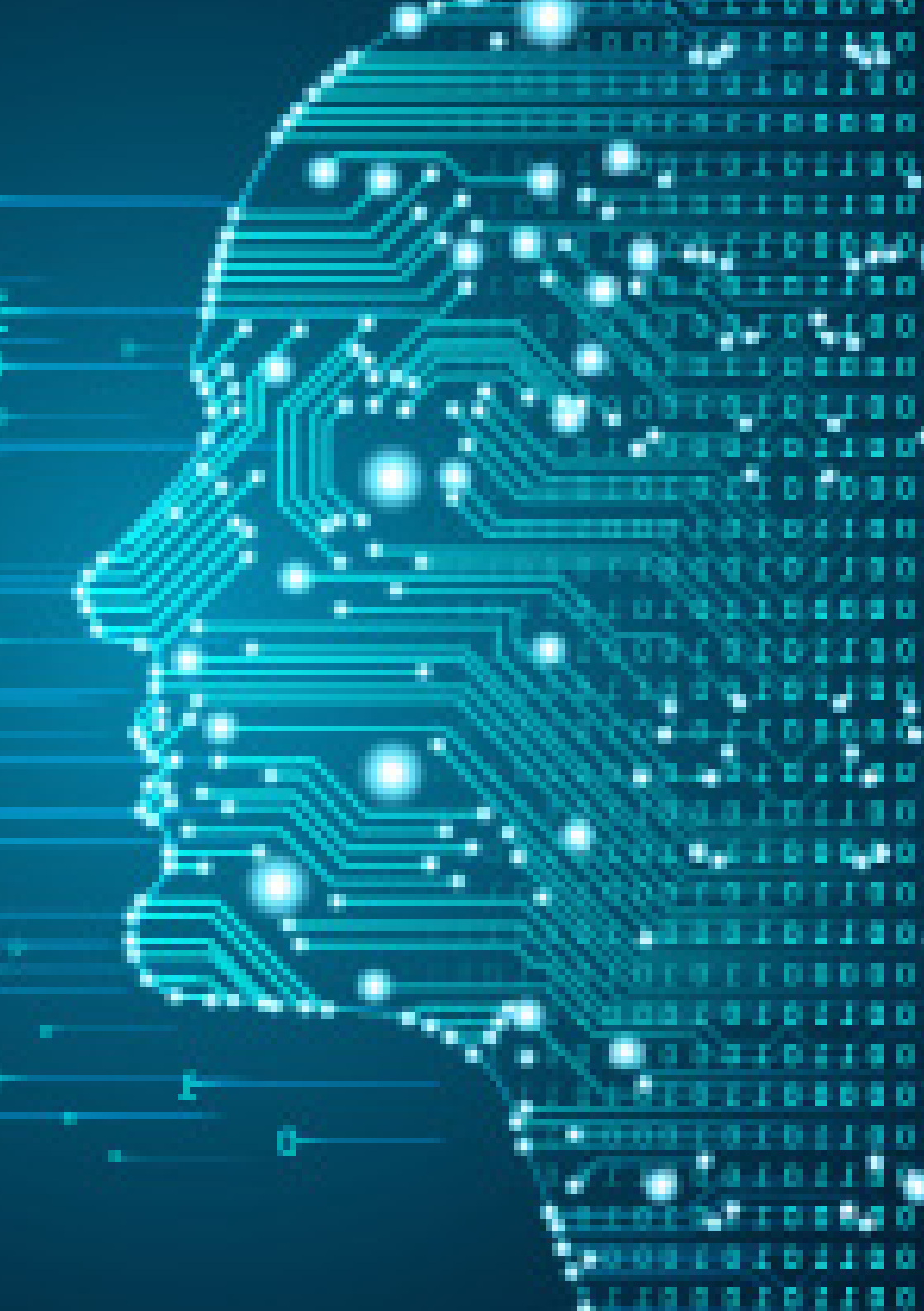
- 16 ECTS from CAS AML
- 16 ECTS from CAS ADS/NLP
- 2 ECTS from DAS Module
- 4 ECTS from DAS Thesis

MAS Extended Intelligence

The CAS Natural Language Processing (NLP) can be combined with the CAS Advanced Machine Learning (AML) and the CAS Applied Data Science (ADS) into a Master of Advanced Studies in Extended Intelligence - the MAS XI.

The scope of the MAS XI comprises 62 ECTS:

- 16 ECTS from CAS AML
- 16 ECTS from CAS ADS/AICP/AI4T/ASDS/AI-MI
- 16 ECTS from CAS NLP/AICP/AI4T/ASDS/AI-MI
- 2 ECTS from MAS Module
- 12 ECTS from MAS Thesis



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www.math.unibe.ch/weiterbildung