Study Plan for the CAS Study Program in Artificial Intelligence for Teachers

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**UNIVERSITÄT
BERN**

22. Oktober 2024

The study program Artificial Intelligence (AI) for Teachers is a continuing education program leading to the award of the Certificate of Advanced Studies in Artificial Intelligence for Teachers by the University of Bern and the Bern University of Teacher Education PHBern (CAS AI4T Unibe).

The legal basis is the regulations for the certificate course Artificial Intelligence for Teachers of 2024-11-07.

1. Objectives, Scope, and Structure of the Study Program

Objectives CAS AI4T

The participants:

a are familiar with the history and present of technological aids in pedagogy and didactics and can critically assess their influence on learners, teachers and society

b have a fundamental understanding of common self-adaptive algorithms, their design, training and evaluation

c can carry out basic language processing and train and use generative algorithms

d can use AI to plan, diagnose and evaluate learning processes in a responsible and targeted manner

e understand how bias arises, know the legal basis and the ethical and sociopolitical aspects of the use of AI in learning processes, in particular possible negative effects on learners and teachers

f are familiar with current debates and tools on the use of AI in pedagogy and didactics

g can critically develop, run and communicate an AI project for learning processes

Scope and Structure CAS AI4T

The CAS Artificial Intelligence for Teachers comprises at least 16 ECTS credits (total effort approx. 480 hours) and consists of the following elements:

a six compulsory modules (12 ECTS)

b final project (4 ECTS)

The detailed description of the modules can be found in the appendix to this study plan. The Program Management may extend and adapt the catalogue of modules. All modules support distant learning.

Language	The course language in all modules is English. All performance assessments (module assessments, written assignments, presentations) are conducted in English. Lecturers may accept assessments in a national language.

2. Performance Assessments

Performance Assessment	Written and/or oral assessment per module in the form of quizzes and/or exercises and/or group works and/or presentations and/or final examinations. Upon assessment modules are either passed or not passed. Further grading is not given.
	The specific form of the module assessments can be found in the module tables in the appendix to the study plan.

AI project	**Final Project**
	Scope: 4 ECTS
	Participants will apply and demonstrate the knowledge acquired throughout the program with their own AI project. The project will be presented in a written and oral manner and must be approved by a referee.

3. Final Provisions

Entry into force	This study plan enters into force on 2025-01-01.

Released by the Program Management:

Bern, 22. October 2024

Prof. Dr. Thomas Wihler (chairman)

Approved by the Faculty of Science, University of Bern

Bern, 7. November 2024

Prof. Dr. Jean-Louis Reymond (dean)

Annex to the study plan of the CAS AI4T - Module Catalogue

Module 1: History and Present of Technology in Teaching (Lead Unibe and PHBern)

ECTS-points	**2 ECTS-points** (including self-study, project work and performance review)	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we review the history and present of technological aids in pedagogy and didactics and become able to critically assess their influence on learners, teachers and society.		
Learning objectives	• Definitions of technology, in particular machine learning and AI • Differences between AI and other technologies • History of technology application in education and consequences for learners, teachers and society • Machine Learning		
Learning outcomes	Graduates • know past and present technologies for teaching, their definitions and differences • have a general understanding of AI and its history • know past and present impacts of technology use on learners, teachers and society • can apply and deploy simple machine learning algorithms		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Basic teaching and programming experience		
Language	English		

Module 2: Technical Foundations 1 – Machine Learning (Lead Unibe)

ECTS-points	**2 ECTS-points** (including self-study, project work and performance review)	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we learn about common machine learning algorithms, how to train, fine-tune and assess them.		
Learning objectives	• Data handling and preprocessing • Important concepts in Machine Learning • Design, training and assessment of neural networks • Bias		
Learning outcomes	Graduates • can perform basic data processing and cleaning • know common performance measures and training techniques • can design, train and assess neural networks • understand different sources of bias		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Basic teaching and programming experience		
Language	English		

Module 3: Technical Foundations 2 – NLP and Generative Models (Lead Unibe)

ECTS-points	2 ECTS-points (including self-study, project work and performance review)	Scope	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we learn common techniques for natural language processing and how to build, train, fine-tune and assess generative models		
Learning objectives	• Fundamental Natural Language Processing (NLP) techniques • Generative models • Application and assessment of generative models • Bias in generative models		
Learning outcomes	Graduates • can apply basic Natural Language Processing (NLP) tasks • know common generative and language models • can apply and evaluate large language models • understand how bias appears in generative models		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Basic Machine Learning and programming experience		
Language	English		

Module 4: AI in Education 1 – Planning, Diagnostics and Assessment (Lead PHBern)

ECTS-points	**2 ECTS-points** (including self-study, project work and performance review)	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we critically study the usage of AI algorithms for planning, diagnostics and assessment in education. Current solutions serve as exemplification and inspiration.		
Learning objectives	- Planning, diagnostics and assessments with AI support - Didactic methods with AI assistance - Risks		
Learning outcomes	Graduates - can apply AI tools for planning, diagnostics and assessment in teaching - know how AI can assist learners and teachers in and outside class - can critically assess risks and benefits from digital solutions for learners and teachers, in particular from AI		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Basic experience with Machine Learning and generative AI		
Language	English		

Module 5: AI in Education 2 – Ethical, legal and sociopolitical Aspects (Lead PHBern)

ECTS-points	**2 ECTS-points** (including self-study, project work and performance review)	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we learn and discuss about ethical aspects of supporting educational processes with AI, about the legal framework that applies to the use of AI in education, and finally, about the social and professional impacts regarding the use of AI in educational processes		
Learning objectives	• Bias, fairness and explainability in AI systems • Intellectual property, copyright, licenses, patents, data protection, privacy, liability and AI policies • Mental and sociopolitical risks for learners and teachers when working with AI technology		
Learning outcomes	Graduates • understand sources of bias in AI algorithms and can apply amending techniques • know the legal framework and guidelines for applying AI in educational processes • know mental and sociopolitical risks for learners and teachers using AI		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Basic experience with Machine Learning and generative AI		
Language	English		

Module 6: AI in Education 3 – Selected Topics (Lead PHBern)

ECTS-points	**2 ECTS-points** (including self-study, project work and performance review)	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we learn and discuss about important past and present topics and tools related to AI in educational processes		
Learning objectives	• Selected topics on AI in pedagogy and didactics		
Learning outcomes	Graduates • know and understand important topics regarding AI in educational processes • can apply and use related tools		
Didactic methods	Lectures and inverted classrooms, hands-on tutorials with computational notebooks, discussions, project work with presentation and peer feedback		
Prerequisites	Teaching and AI experience		
Language	English		

CAS AI4T Final Project (Lead Unibe and PHBern)

ECTS-points	4 ECTS-points	**Scope**	About 60 working hours (incl. appr. 20 in person hours)
Performance review	Written and or oral presentation	**Attendance requirement**	80 %
Description and contents	In this module we perform an own comprehensive AI project for an educational context		
Learning objectives	• Design, implementation and communication of an AI project in an educational context		
Learning outcomes	Graduates • can conceive, create, implement and communicate an AI project for an educational context		
Didactic methods	Project work with supervision		
Prerequisites	Teaching and AI experience		
Language	English		