Specialization Certificates

Intelligent Systems

Students holding this certificate have focused on artificial systems with particular attention to concepts such as intelligence, agency, autonomy, and reasoning. It is intended for students who want to analyse what it means for a system to count as intelligent, how such systems should be understood conceptually, and how they affect human practices and forms of life.
Exemplary courses: *AI, Robots, Superintelligence: Philosophy in Fiction; Human–AI Collaboration; Intelligent User Interfaces; Minds & Machines; Seeing You, Knowing You: Emotional Expression and Social Cognition*

Policy & Regulation

Students holding this certificate have focused on the governance of digital technologies in political, legal, and societal contexts. It is intended for students who are interested in how emerging technologies should be regulated, which normative principles should guide such regulation, and how institutions can respond to technological change in a responsible manner.
Exemplary courses: *Political Philosophy; Critical Data Studies; AI and The Future of Work; Ethics under Uncertainty; Epistemic Injustice; Algorithmic Fairness*

Ethics of New Technologies

Students holding this certificate have focused on the ethical evaluation of emerging technologies, especially AI, data-driven systems, and related forms of automation. It is intended for students who want to investigate issues such as responsibility, fairness, risk, discrimination, social impact, and the moral assessment of technological innovation.
Exemplary courses: *Machine Ethics; Ethics under Uncertainty; AI and The Future of Work; Critical Data Studies; Epistemic Injustice; Ethical and Legal Issues in IT Security Research*

Machine Learning & Computation

Students holding this certificate have focused on computational and machine-learning-based approaches for modelling, inference, and problem-solving. It is intended for students who want a technically oriented specialization with a strong emphasis on algorithmic thinking, mathematical foundations, and the development or analysis of computational methods.
Exemplary courses: *Graph Processing and Machine Learning (GPML); Machine Learning Methods in Healthcare; Causal Inference; Machine Learning; Data Analysis in R*

Data Analysis & Data Processing

Students holding this certificate have focused on the handling of data, including data preparation, analysis, interpretation, and processing. It is intended for students who want to build methodological competence in working with data and who are interested in empirical, statistical, and computational approaches to extracting and communicating insights from data.
Exemplary courses: *Data Analysis in R; Causal Inference; Information Visualization; Introduction to Computer Assisted Text Analysis; Social Network Analysis; Machine Learning Methods in Healthcare; Process Mining*

Human-Computer Interaction

Students holding this certificate have focused on the design, implementation, and evaluation of interactive digital systems as well as their effects on stakeholders. It is intended for students who want an understanding of user interfaces, interaction design, human-AI collaboration, and the analysis of how systems can be made usable, intelligible, and effective for human users.
Exemplary courses: *Intelligent User Interfaces; Human AI Collaboration; Information Visualization; Seeing You, Knowing You: Emotional Expression and Social Cognition.*

Note: As course offerings vary from term to term, no fixed set of courses automatically leads to a specialization. Instead, students may propose an individual combination of courses, subject to review by the examination board.