

COURSE SYLLABUS

Research Methods in SE4AI, 7.5 credits

Forskningsmetoder i SE4AI, 7.5 högskolepoäng

Course Code:	T2FIOT	Education Cycle:	Second-cycle level
Confirmed:	Sep 01, 2025	Disciplinary domain:	Technology
Valid From:	Jan 18, 2027	Subject group:	Computer Technology
		Specialised in:	A1F Second cycle, has second-cycle course/s as entry requirements
		Main field of study:	Computer Science

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and understanding

- demonstrate comprehension of well-established research methodologies relevant in software engineering (SE) and their general characteristics.
- display knowledge of the differences between qualitative, quantitative, and hybrid research methods in SE, including data collection techniques, such as surveys, interviews, experiments, and case studies in SE research.

Skills and abilities

- demonstrate the ability to design and conduct empirical research that develops and/or evaluates software processes, tools, and AI-enabled systems.
- demonstrate the ability to use appropriate statistical and data analysis techniques to evaluate and interpret empirical data.
- demonstrate the ability to conduct (systematic) literature reviews and perform meta-analysis of SE topics.
- demonstrate the ability to write well-structured, -grounded research papers and reports aligned with academic standards.
- demonstrate the ability to use tools for data analysis, literature management, and research documentation, such as LaTeX, BibTeX, RefWorks, and Mendeley.

Judgement and approach

- demonstrate the ability to critically evaluate existing research in SE and AI-enabled systems.
- demonstrate the ability to assess the validity, reliability, and generalizability of research findings.

Content

This course introduces research methodologies and practices in the context of software engineering, with a focus on AI/ML-enabled systems. Students will learn to design, conduct, and evaluate empirical studies while exploring qualitative, quantitative, and mixed-method approaches. The course also covers techniques for systematic literature review, data analysis, and academic writing. By the end of the course, students will be equipped to critically analyze research in SE and contribute to the field through their own research projects.

The course includes the following elements:

- Introduction to Research Methods in Software Engineering
- Formulating Research Questions and Hypotheses
- Empirical Research Techniques

- Data Collection and Analysis
- Research Validity and Reliability in SE Research
- Writing and Presenting Research in SE

Type of instruction

The teaching mainly consists of lectures, assignments, workshops and seminars.

Language of instruction is English.

Entry requirements

Passed courses at least 90 credits within the major subject computer engineering, computer science, informatics, information systems or information technology, including a minimum of 15 credits in mathematics and at least 30 credits in programming/software development, or alternatively passed courses at least 150 credits from the programme Computer Science and Engineering, and taken AI Systems in Production, 7.5 credits and Machine Learning , 7.5 credits.

Examination and grades

The course is graded 5, 4, 3 or U.

Registration of examination:

Name of the Test	Value	Grading
Assignment	7.5 credits	5/4/3/U

Course literature

Please note that changes may be made to the reading list up until eight weeks before the start of the course.

Wohlin, C., Runeson, P., Höst, M., Ohlsson, M. C., Regnell, B., & Wesslén, A. (2012). Experimentation in software engineering (Vol. 236). Berlin: Springer.

Yin, R. K. (2009). Case study research: Design and methods (Vol. 5). Sage.

Wieringa, R. (2014). Design science methodology for information systems and software engineering. Springer-Verlag Berlin Heidelberg.

Stol, K. J., & Fitzgerald, B. (2018). The ABC of software engineering research. ACM Transactions on Software Engineering and Methodology (TOSEM), 27(3), 1-51.