

COURSE SYLLABUS

Developing LLM-Enabled Systems, 7.5 credits

Utveckling av LLM system, 7.5 högskolepoäng

Course Code:	T2UALS	Education Cycle:	Second-cycle level
Confirmed:	Sep 01, 2025	Disciplinary domain:	Technology
Valid From:	Aug 30, 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

- display knowledge of transformer-based architectures and agentic AI, including their role in AI-enabled systems
- demonstrate comprehension of prompt engineering, fine-tuning, retrieval-augmented generation (RAG), and how these contribute to building autonomous or semi-autonomous AI agents

Skills and abilities

- demonstrate the ability to develop and deploy applications leveraging LLMs for tasks such as text generation, summarization, reasoning, and interaction
- demonstrate the ability to implement techniques, such as fine-tuning, RAG, and tool integration to enable domain-specific and agentic behaviors.
- demonstrate the ability to utilize both API-based and self-hosted LLMs in scalable, robust AI-Enabled systems, incorporating testing and quality assurance practices to ensure reliability and performance.
- demonstrate the ability to design and implement system architectures that integrate LLMs with external tools or services to enable autonomous behaviors in agentic AI systems.

Judgement and approach

- demonstrate the ability to evaluate the strengths and limitations of different AI approaches for various problems, including the appropriateness of agentic AI in context.
- demonstrate the ability to critically analyze trade-offs in large language model selection, deployment strategies, quality assurance, and user interaction design, especially when testing and validating autonomous, agentic AI systems.

Content

The course focuses on practical aspects of developing AI systems enabled by LLMs. Students will explore both theoretical foundations and hands-on development techniques, gaining experience in integrating LLMs into various applications, including agentic AI systems capable of autonomous task completion.

The course includes the following elements:

- Foundation of LLMs
- LLM capabilities, limitations, and deployment options, including when using cloud-based vs. self-hosted LLMs.
- Prompt Engineering and techniques for optimizing model responses.
- Fine-Tuning & adaptation: Customizing LLMs for specific tasks and domains.

- Retrieval-Augmented Generation (RAG): Combining LLMs with external data sources.
- Testing and quality Assurance: ensuring reliability, safety, and performance of LLM-enabled systems.
- Agentic AI: Designing systems where LLMs take initiative, use tools, and act autonomously.
- System architecture: designing scalable, efficient, and cost-effective LLM-based applications.
- Evaluation & Optimization: performance metrics, latency management, cost trade-offs, and assessing agentic behavior.

Type of instruction

The teaching in the course consists mainly of lectures, assignments, and tutoring.

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 Deep 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
Examination ¹	3.5 credits	5/4/3/U
Assignment	4 credits	G/U

¹Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

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