

SYLLABUS

STUDY YEAR 2024/2025

Master Programme in Applied Artificial Intelligence

Enrollment semester Autumn 2024

DATE

2023-10-25

REFERENCE NO.

LTU-4281-2023

DECISION MAKER

Dean of the Faculty of Science and Technology

Programme content and structure

In order to obtain a Master's degree in Applied Artificial Intelligence 300 credits the following is required:

- that the programme's mandatory courses of 180 credits are completed,
- that the master's thesis of 30 credits is completed,
- that mandatory and electable courses in the chosen specialization are completed,
- that a total of 300 credits (including 30 credits of electable courses) are completed

Of the 300 credits, courses must be selected so that at least 90 credits are on advanced level, of which 30 credits corresponds to the master's thesis. The following specializations are offered: AI and Neuroscience, Industrial AI . Election of one of the named specializations is mandatory. Each specialization consisting of 60 credits of courses, including electable courses of at least 15 credits. Additionally, the master's thesis (30 credits) has to be carried out within the elected specialization area. For admission to the degree project course entry requirements specified in the Course Syllabus must be completed. Information regarding the application- and admission process is given and ensured by the responsible department.

Credits

300 credits

Degree

- Degree of Master of Science in Engineering, Applied Artificial Intelligence

Specialisations

Specialisation

- AI and Neuroscience
- Industrial AI

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language + Swedish upper secondary school courses Physics 2, Chemistry 1, Mathematics 4 or Mathematics E.

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Compulsory courses

Base courses 52.5 credits

Course code	Course	Cr	Level	Comment
F0004T	Physics 1	7.5	Bachelor's level	
F0005T	Physics 2	7.5	Bachelor's level	
G0010N	Industrial Management with a Sustainability Perspective	7.5	Bachelor's level	
M0047M	Differential calculus	7.5	Bachelor's level	
M0048M	Linear Algebra and Integral Calculus	7.5	Bachelor's level	
M0049M	Linear Algebra and Differential Equations	7.5	Bachelor's level	
S0008M	Probability Theory and Statistics	7.5	Bachelor's level	

Core courses 127.5 credits

Course code	Course	Cr	Level	Comment
New	Advanced Robotics and AI	7.5	Master's level	
D0009E	Introduction to Programming	7.5	Bachelor's level	
D0010E	Object-oriented Programming and Design	7.5	Bachelor's level	
D0012E	Algorithms and Data Structures	7.5	Bachelor's level	
D0029E	Computer and network security	7.5	Bachelor's level	
D0032E	Introduction to AI	7.5	Bachelor's level	
D0033E	Machine Learning and Pattern recognition	7.5	Bachelor's level	
D0034E	Applied AI, Knowledge Management and Reasoning	7.5	Bachelor's level	
D7046E	Neural networks and learning machines	7.5	Master's level	
D7047E	Advanced deep learning	7.5	Master's level	
E0013E	Fundamentals of Electrical Engineering	7.5	Bachelor's level	
K0025K	Chemistry for Sustainable Development	7.5	Bachelor's level	
M0009M	Discrete Mathematics	7.5	Bachelor's level	
R0002E	Modelling and Control	7.5	Bachelor's level	
R7003E	Automatic Control	7.5	Master's level	
R7010E	Robotics	7.5	Master's level	

Course code	Course	Cr	Level	Comment
S0004E	Signals and systems	7.5	Bachelor's level	

Optional space 15 credits

Credits för optional courses is 15 credits. Within the optional space of the programme it is possible to chose optional courses. The given number of credits must be met for degree.

Specialisation: AI and Neuroscience

Compulsory courses 75 credits

Course code	Course	Cr	Level	Comment
New	Project in AI and Neuroscience	15	Master's level	
New	Master Thesis in Artificial Intelligence, Specialisation AI and Neuroscience, Master of Science	30	Master's level	
D7064E	Neuromorphic Computing	7.5	Master's level	
D7068E	Neurochemistry for AI	7.5	Master's level	
M7016H	Artificial Intelligence within the Healthcare System	7.5	Master's level	
P7002H	Human Cognitive Neuroscience	7.5	Master's level	

Selective course 15 credits

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
F7037T	Modern Experimental Metrology	7.5	Master's level	Selectable
F7053T	Biosensors, Signals and transducers	7.5	Master's level	Selectable
R7017E	Biorobotics	7.5	Master's level	Selectable
S7013E	Measurement systems: design, modeling and computational methods	7.5	Master's level	Selectable

Optional space 15 credits

Credits för optional courses is 15 credits. Within the optional space of the programme it is possible to chose optional courses. The given number of credits must be met for degree.

Specialisation: Industrial AI

Compulsory courses 75 credits

Course code	Course	Cr	Level	Comment
New	Master thesis in Artificiell Intelligence, Specialisation Industrial AI, Master of Science	30	Master's level	
New	AI in the Process Industry and Automation	7.5	Master's level	
New	Project in Industrial AI	15	Master's level	
D7041E	Applied Artificial Intelligence	7.5	Master's level	
D7043E	Advanced Data Mining	7.5	Master's level	
D7065E	Embedded Intelligence at the Edge	7.5	Master's level	

Selective courses 15 credits

Selective space is 15 credits. It is mandatory to select elective courses up to the given number of credits. The given number of credits of elective courses listed must be met for degree.

Course code	Course	Cr	Level	Comment
D7017B	Augmented Decision Making	7.5	Master's level	Selectable
D7018B	Industrial AI for Operation and Maintenance	7.5	Master's level	Selectable
D7044E	Business Intelligence	7.5	Master's level	Selectable
R7017E	Biorobotics	7.5	Master's level	Selectable

Optional space 15 credits

Credits för optional courses is 15 credits. Within the optional space of the programme it is possible to chose optional courses. The given number of credits must be met for degree.

Study schedule

Year of study 1 Enrollment semester Autumn 2024, Is offered in 2024/2025

Study-period	Course code	Course	Cr	Comment
1	D0009E	Introduction to Programming	7.5	
1	D0032E	Introduction to AI	7.5	
2	F0004T	Physics 1	7.5	
2	M0009M	Discrete Mathematics	7.5	
3	D0010E	Object-oriented Programming and Design	7.5	
3	M0047M	Differential calculus	7.5	
4	D0033E	Machine Learning and Pattern recognition	7.5	
4	M0048M	Linear Algebra and Integral Calculus	7.5	

Year of study 2 Enrollment semester Autumn 2024, Is offered in 2025/2026, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	K0025K	Chemistry for Sustainable Development	7.5	
1	M0049M	Linear Algebra and Differential Equations	7.5	
2	D0012E	Algorithms and Data Structures	7.5	
2	D0034E	Applied AI, Knowledge Management and Reasoning	7.5	
3	F0005T	Physics 2	7.5	
3	S0008M	Probability Theory and Statistics	7.5	
4	R0002E	Modelling and Control	7.5	
4	S0004E	Signals and systems	7.5	

Year of study 3 Enrollment semester Autumn 2024, Is offered in 2026/2027, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	D0029E	Computer and network security	7.5	
1	G0010N	Industrial Management with a Sustainability Perspective	7.5	
2	E0013E	Fundamentals of Electrical Engineering	7.5	
2	R7003E	Automatic Control	7.5	
3	D7046E	Neural networks and learning machines	7.5	
3		Credits för optional courses	7.5	
4	D7047E	Advanced deep learning	7.5	
4		Credits för optional courses	7.5	

Specialisation: AI and Neuroscience

Year of study 4 Enrollment semester Autumn 2024, Is offered in 2027/2028, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	D7068E	Neurochemistry for AI	7.5	
1	M7016H	Artificial Intelligence within the Healthcare System	7.5	
2	D7064E	Neuromorphic Computing	7.5	
2	R7010E	Robotics	7.5	
3	F7053T	Biosensors, Signals and transducers	7.5	Selectable
3	R7017E	Biorobotics	7.5	Selectable
3		Credits för optional courses	7.5	
4	F7037T	Modern Experimental Metrology	7.5	Selectable
4	S7013E	Measurement systems: design, modeling and computational methods	7.5	Selectable
4		Credits för optional courses	7.5	

Year of study 5 Enrollment semester Autumn 2024, Is offered in 2028/2029, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	New	Advanced Robotics and AI	7.5	
1-2	New	Project in AI and Neuroscience	15	
2	P7002H	Human Cognitive Neuroscience	7.5	
3-4	New	Master Thesis in Artificial Intelligence, Specialisation AI and Neuroscience, Master of Science	30	

Specialisation: Industrial AI

Year of study 4 Enrollment semester Autumn 2024, Is offered in 2027/2028, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	D7043E	Advanced Data Mining	7.5	
1	D7065E	Embedded Intelligence at the Edge	7.5	
2	D7041E	Applied Artificial Intelligence	7.5	
2	R7010E	Robotics	7.5	
3	D7044E	Business Intelligence	7.5	Selectable
3	R7017E	Biorobotics	7.5	Selectable
3		Credits för optional courses	7.5	
4	D7017B	Augmented Decision Making	7.5	Selectable
4	D7018B	Industrial AI for Operation and Maintenance	7.5	Selectable
4		Credits för optional courses	7.5	

Year of study 5 Enrollment semester Autumn 2024, Is offered in 2028/2029, planned study schedule

Study-period	Course code	Course	Cr	Comment
1	New	Advanced Robotics and AI	7.5	
1-2	New	Project in Industrial AI	15	
2	New	AI in the Process Industry and Automation	7.5	
3-4	New	Master thesis in Artificiell Intelligence, Specialisation Industrial AI, Master of Science	30	