UNIVERSITY OF SKÖVDE

TRANSLATION FROM SWEDISH

**PROGRAMME SYLLABUS**

# Industrial Informatics - Master's Programme

**120 credits**

**Programme code:** INDMA
**Version number:** 1
**Valid from:** Autumn term 2027
**Ratified by:** Faculty Board at the University of Skövde
**Date of ratification:** 2 September 2026

## 1. General information about the study programme

The study programme is provided by the University of Skövde and is named Industrial Informatics - Master's Programme (Industriell informatik - masterprogram). It comprises 120 credits and is a second-cycle programme. The main field of study is Industrial Informatics.

## 2. Entry requirements

A Bachelor's degree equivalent to a Swedish Kandidatexamen of 180 credits with a major within the main field of industrial informatics, mechanical engineering, production engineering, automation engineering, electrical engineering, computer engineering, information technology (or the equivalent).

Additionally 22.5 credits are required in mathematics, including single-variable and multivariable calculus, linear algebra and mathematical statistics. In addition, at least 7.5 credits in programming and 7.5 credits in AI, machine learning or data-driven analysis are required.

A further requirement is proof of skills in English equivalent of studies at upper secondary level in Sweden, known as English course 6 or English level 2 (or equivalent). This is normally demonstrated by means of an internationally recognized test, e.g. IELTS, TOEFL or the equivalent.

The entry requirements above are applicable for admission to the study programme. For further studies within the programme, the entry requirements for each course must be met. These entry requirements are specified in each separate course syllabus.

## 3. Study programme content

The programme provides broad and in-depth knowledge in Industrial Informatics with a focus on the development and optimization of manufacturing and production systems. The programme is based on a technically and mathematically grounded systems perspective on the industrial information chain and combines mathematical modelling, simulation and optimization with industrial data analytics, artificial intelligence and cyber-physical production systems.

During the first semester, the programme's mathematical and scientific foundation is established together with introductory second-cycle knowledge in industrial AI and optimization. During the second semester, knowledge is deepened and integrated through process analysis, simulation, multi-objective optimization and an industry-based assignment. The third semester provides subject-specific specialization in generative and physics-informed AI, cyber-physical production systems, optimization-driven design and collaborative robotics.

The industry-based course provides students with the opportunity to integrate knowledge from the main field of study in an advanced assignment under real technical and organizational conditions. The programme concludes with a 30-credit degree project, in which the student plans and carries out an advanced assignment using scientific or engineering methods and evaluates the results and contribution to knowledge.

**The following courses are included in the programme**

Differential Equations and Transforms G1F, 7.5 credits

Research Methods in Industrial Informatics A1N, 7.5 credits

Optimization of Industrial Systems A1F, 7.5 credits

Industrial Applications of AI A1F, 7.5 credits

Industry-Based Course in Industrial Informatics A1F, 15 credits

Simulation and Optimization for Decision Support A1F, 7.5 credits

Process Mining for Manufacturing Processes A1F, 7.5 credits

Generative and Physics-Informed AI A1F, 7.5 credits

Cyber-Physical Manufacturing A1F, 7.5 credits

Optimization-Driven Design A1F, 7.5 credits

Collaborative Robotics A1F, 7.5 credits

Master Degree Project in Industrial Informatics A2E, 30 credits

## 4. General objectives

**Objectives for education at the second-cycle level in The Higher Education Act**

Second-cycle courses and study programmes shall involve the acquisition of specialist knowledge, competence and skills in relation to first-cycle courses and study programmes, and in addition to the requirements for first-cycle courses and study programmes shall:

- further develop the ability of students to integrate and make autonomous use of their knowledge,
- develop the students' ability to deal with complex phenomena, issues and situations, and
- develop the students' potential for professional activities that demand considerable autonomy, or for research and development work.

## 5. Study programme objectives

Main field of study is Industrial Informatics.

**Objectives for Master's Degree according to the Higher Education Ordinance**

**Knowledge and understanding**

For a master's degree (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialized methodological knowledge in the main field of study.

**Competence and Skills**

For a master's degree (120 credits) the student shall

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information,
- demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work,
- demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

**Judgement and Approach**

For a master's degree (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work,
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

**Local Objectives for the Study Programme according to the University of Skövde**

Students shall, after completion of the programme

- demonstrate a considerable degree of specialised knowledge of how data-driven and physics-based methods can be integrated to analyse, develop and optimize manufacturing and production systems.

## 6. Language of instruction

The teaching is conducted in English.

## 7. Degree qualification

A student who passes the courses in the programme fulfils the requirements for obtaining a Degree of Master of Science (120 credits) with a major in Industrial Informatics.

Degree certificates are issued after application. Information about how to submit an application can be found on the website of the University of Skövde.

## 8. Changes to the programme syllabus

The programme syllabus and its courses may be changed, within the framework of the objectives for the study programme.

## 9. Student influence

Student influence in the study programme is ensured by means of programme evaluations. The students are informed about the results of the evaluations and potential measures that have been taken or are planned, based on the course evaluations.

## 10. Additional information

Further information about the study programme, as well as national and local governing documents for higher education, is available on the website of the University of Skövde.