Programme Description

Master in Manufacturing Engineering

TATIK – Autumn 25

Decision taken by	Institution board
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This template for programme descriptions was adopted by the Research and Education Board, HV 2022/508, 21 September 2022, editorial change 25 October 2022. Programme description is a supplement to the programme syllabus which is the legally binding document.

Basic data

Department	Department of Engineering Science
Division	Division of Mechanical engineering
Name of Programme, Swedish	Master i tillverkningsteknik
Name of Programme, English	Master in Manufacturing Engineering
HE credits (number of credits)	120
Level (1st Cycle, 2nd Cycle)	2nd Cycle
Entry requirements, Swedish	Kandidatexamen, alternativt en till omfattningen motsvarade högskoleingenjörsexamen, inom maskinteknik, tillverkningsteknik, materialteknik, industriell ekonomi eller motsvarande och Engelska 6 eller motsvarande. I utbildningen på grundnivå skall minst 7.5 hp materialteknik och minst 15 hp matematik innefattande grundläggande kunskaper i analys, linjär algebra och statistik ingå.
Entry requirements, English	Degree of Bachelor of Science in mechanical engineering, manufacturing engineering, industrial engineering, materials science and engineering or equivalent. The Bachelor of Science degree must be comprised of a at least 7.5 HE credits of materials science and at least 15 credits of mathematics including basic knowledge of analysis, linear algebra and statistics. In addition, verified knowledge of English corresponding to the course English 6 in the Swedish upper-secondary level or equivalent.
Main field of study, Swedish	Maskinteknik
Main field of study, English	Mechanical Engineering
Degree, Swedish	Teknologie masterexamen med huvudområdet maskinteknik
Degree, English	Degree of Master of Science (120 credits) with a major in Mechanical Engineering
Rate of study (full-time, part-time)	Full-time

Type of instruction (on campus, distance teaching)	Campus
Language of instruction (Sw, Eng)	English

General programme information

Manufacturing methods strongly influence the design, quality and economy of the production. In this program you learn to plan, design, develop and integrate processes, systems, machines and tools for the manufacture of high-quality products. University West's two-year master's program in manufacturing technology is entirely taught in English and designed in close collaboration with industry, with new methods, new materials and new manufacturing processes. The second year includes the course industrial placement, which is a project course. This project course could be based either at a company or at the university. Features can include integration of real-world work situations and access to advanced manufacturing labs. This two-year program is designed for recent graduates. There is also a one-year master of manufacturing program suitable for students with a few years of experience as engineers.

Within the program, you also get access to advanced laboratories, simulation tools and access to experts. In addition to that, you have access to: welding technology, world-leading thermal spraying facilities, AM technologies, measurement and control systems for in situ monitoring and inspection, microstructural inspection and microanalysis including optical microscopy and scanning electron microscopy, geometric and surface topography assessment using 3D profilometry, mechanical testing including microhardness, tensile strength, creep and fatigue at room temperature and high temperature, thermomechanical simulation and testing with a Gleeble welding simulator, wear, corrosion and electrochemical investigations in various environments at room temperature and high temperature, non-destructive testing with ultrasound, X-ray, infrared camera and eddy current, etc.

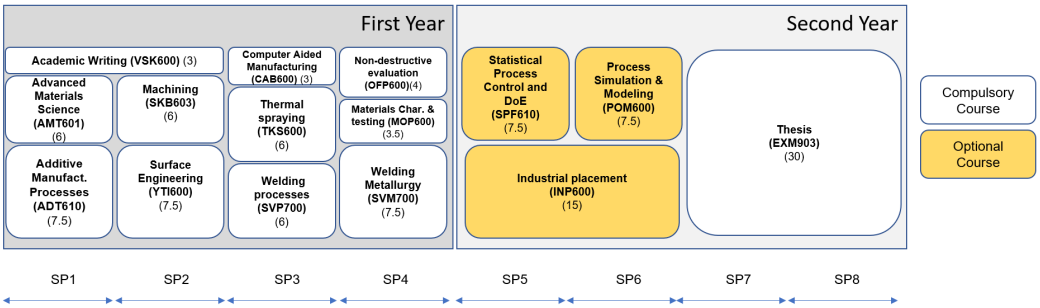
You will be introduced to some of the above equipment/simulation tools during your courses, and you may work with some of them, based on the topic of your thesis.

Programme contents, structure, and progression

After completing the program the student will earn a degree of Master of Science (120 credits) with a major in Mechanical Engineering. The courses that are given within the program is shown below. First the students will take courses in materials science combined with a course in additive manufacturing during the first quarter, in the second quarter they will proceed with a machining and surface engineering

course. Spanning over the first semester you will in addition also do a three credits course in academic writing. The second semester the student will do courses in computer aided manufacturing, thermal spraying, welding process, non-destructive evaluation, materials characterization, and metallurgy of welding and AM. The second year is composed of an industrial placement course. This is a project course where the students do a project with an industrial partner, either at the company or at the university. In addition to the industrial placement course there are two other courses the third semester. Statistical process control and DOE and process simulation and modelling. The courses during the third semester are optional, meaning that the student can do an exchange period in another country this semester, taking courses related to the subject of manufacturing technologies (the courses cannot be overlapping with courses already done during the first and second semester). During the final semester the students will do a 30 credits master thesis.

Manufacturing Engineering (TATIK, 2-year, 120 ECTS)



The research basis for the programme

The master's program in manufacturing engineering ensures relevance to the research it is based upon through a variety of methods, such as incorporating industry partners and current research projects into the curriculum, requiring students to complete a research project and thesis. The program have industry partners that collaborate with the program to provide students with practical, real-world experience and to ensure that the curriculum is up-to-date with the latest developments in the field. Additionally, the program requires students to complete a research project or thesis that addresses a current issue in manufacturing, such as sustainable manufacturing or advanced manufacturing technologies.

In the classroom, scientific literature and research articles are used to provide students with a deeper understanding of the field and to expose them to current

research and perspectives. For example, professors might assign readings from scientific journals and ask students to critically analyze and discuss the articles in class. Additionally, professors might use case studies and real-world examples from industry to help students understand how the concepts they are learning about are applied in practice.

The labour market, collaboration, and work-integrated learning[1]

The manufacturing engineering master's program equips students with the knowledge and skills needed to design, develop, and manage the production of goods in a variety of industries. These competencies are highly relevant in local, national, and international labor markets, as manufacturing is a key driver of economic growth and job creation. Graduates of the program may find employment opportunities in roles such as production managers, quality control engineers, materials scientists, manufacturing process engineers, and supply chain managers.

The program is structured to include elements of work-integrated learning and collaboration, which contribute to students' development of the ability to work in a changing world. Work-integrated learning is a systematically ingrained part of the program, allowing students to encounter and apply critical thinking while being given a chance to reflect upon the relationship between theory and practice. This is achieved through various forms of hands-on training.

The program also has a strong focus on collaboration with industry partners, allowing students to gain real-world experience and learn from experts in the field. Partners for collaboration can include manufacturing companies, research organizations, and government agencies. These partners have been involved in the development of the program, ensuring that the program is relevant to the needs of the industry.

As a manufacturing engineering student, you get access to our Production Technology Center (PTC) during your studies. PTC is one of the largest and most up-to-date manufacturing laboratories in Sweden. PTC has been in manufacturing

[1] Work-integrated learning is a pedagogical practice in which students' learning takes place through the integration of theoretical and practical knowledge and experience, derived from an educational context within the framework of both higher education as a work environment and civil society.

research for over 20 years. This collaborative platform offers a unique collection of manufacturing and related advanced industrial research technologies:

In summary, the manufacturing engineering master's program provides students with the knowledge and skills needed to excel in the manufacturing industry, and includes opportunities for work-integrated learning and collaboration with industry partners to ensure that students are prepared to work in a changing world.

Sustainable development

Ecological, economic, and social sustainability are key considerations in the design of the master programme. The program incorporates coursework that focuses on these issues, such as sustainable development. The program also includes opportunities for students to engage in real-world projects and research that address sustainability challenges in their communities.

In terms of developing a democratic, inclusive worldview that includes a gender equality dimension, the program includes coursework and activities that aim to promote these values. The teachers that are giving courses are well informed on gender studies, diversity, and intersectionality. The program manager is also obliged to attend workshops and activities that focus on building inclusive leadership skills and understanding the experiences of marginalized groups.

The program also has a code of conduct that emphasizes the importance of inclusion and respect for diversity. After graduating the student will have a democratic and inclusive worldview.

Internationalisation

Students from all over the world gather in our program to create a unique and international environment. The program is taught entirely in English, and you will study alongside students from Sweden as well as international students from Europe, Asia and elsewhere. Most of your instructors also have international experience in both research and education. An international perspective pervades the master's program in manufacturing through a variety of forms of exchange that contribute to internationalization. Some examples include:

- International students: The program may have a diverse student body that includes international students, who bring different perspectives and cultural experiences to the classroom.
- Study abroad opportunities: Students may have the opportunity to study abroad at a partner university, where they can learn about manufacturing practices in a different country and culture.
- International guest speakers: The program may invite guest speakers from other countries to share their expertise and experiences, providing students with a global perspective on the field.
- International collaborations: The program may have research collaborations with institutions and industries in other countries, providing opportunities for students to work on international projects and gain a global perspective on manufacturing.
- International field trips: Students may have the opportunity to take field trips to manufacturing companies or research institutions in other countries, where they can see first-hand how manufacturing practices and technologies differ across the globe.

All these forms of exchange contribute to internationalization, by providing students with a broader understanding of the global manufacturing industry and an appreciation of different perspectives and cultures.

Other information

A master's program in manufacturing engineering typically includes coursework in advanced manufacturing techniques, such as computer-aided design and manufacturing, additive manufacturing, and materials science. Access to laboratory environments is an important aspect of this program as it allows students to gain hands-on experience with the latest technologies and methods used in the field. This can be significant for students' understanding of the program and for their preparation for the job market as it provides them with practical skills that are in high demand by employers. Furthermore, having access to lab environments can help students to develop a deeper understanding of the material and learn how to apply the knowledge in real-world settings. Additionally, the use of modern and advanced equipment in the laboratory can give students a glimpse of the current and future technologies used in the field, which can help them to understand the current trends and developments in the manufacturing industry.