JÖNKÖPING UNIVERSITY
School of Engineering

PROGRAMME SYLLABUS Preliminary, not confirmed

Industrial Design (master), 120 credits

Programmestart: Autumn 2025

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Industridesign (master), 120 högskolepoäng

Programme code:	TAID5	**Programmestart:**	Autumn 2025
Confirmed by:	Not confirmed	**Education Cycle:**	Second-cycle level
Version:	1		

Title of qualification

Degree of Master of Science (120 credits) with a major in Product Development specialisation in Industrial Design

Programme overview

Background

There is a strong competition on the product market. The products must be competitive in the face of a growing supply of new products offered to consumers and companies on today's world market. We want products that are well adapted to users' requirements while at the same time being efficiently produced and distributed in line with increasing environmental influence demands. These days products compete on a global 24/7 market. Consumers can choose products based on price, quality, performance, reliability and feeling. On such a market, design is crucial for the success or failure of a product. Developing well-designed products often requires a competent staff with a holistic and interdisciplinary approach and a good understanding of the whole product development process. Traditionally, Sweden has had an interdisciplinary approach in product development and design. We have many small and medium-sized enterprises with efficient decision processes and a flat organisation. Consequently there is a great need for qualified product designers being able to handle complex issues as well as having detailed knowledge of the integral components of a product. There is also a development towards an increased number of services that are provided along with the physical products. These services are a major part of the interaction between the product and its user along with the feel and appearance of the product. Another trend is that products are becoming increasingly individualized. The consumers expect to be offered products that meet their individual needs to an increasing degree. Still, the products must be manufactured with a minimum of cost and, most importantly, an increasing degree of sustainability. Digitalization of product development and production makes this possible. Novell materials are being developed at a rapid pace with the increasing demands for sustainable development. Technical as well as aesthetic functions become more and more important when it comes to materials. An increased expertise and cooperation between different competences in materials is a success factor for successful product solutions. It becomes important to integrate the products and their production closely so that a holistic approach on the product lifecycle can be taken, bringing more variety with a limited increase of the product cost.

The program Product Design will address these challenges, preparing the future engineers for the challenges they will be facing in future design and product development.
Product Design has two tracks, i.e., INDUSTRIAL DESIGN and DIGITALISATION IN ENGINEERING DESIGN (DIGITALISATION for short). Students need to choose either of the

two tracks.
The INDUSTRIAL DESIGN track is intended to offer an interdisciplinary approach with a main focus on advanced knowledge of the design and management of colour, shape, surface and material.

The DIGITALISATION track addresses the development towards more individualized products, to better meet the specific needs of each costumer. This encompasses, preparing for the individualization of products and automating repetitive tasks by using software and PLM. The integration of the products and their manufacturing is emphasized in the program as well as the sustainability of the products.

Objectives

Students will after graduation be able to have leading the roles in the development of new or improved products, considering the needs and wants of the customers. They will be able to analyze product proposals and to specify how to manufacture them and make assessments of the expected sustainability during the life-cycle of the proposed products.

Graduates from the program will also be able to take on the task of improving the product development process in companies and proposing how to improve knowledge reuse and to make the product development more efficient. In addition to the creative aspects of the programme, engineering analyses are also trained, involving for example structural analysis and optimization.

Students who have graduated from Product Design will be attractive in job market in that they will have insights in both the creative and analytical sides of product development.

Post-graduation employment areas

After completing the program, the graduates will be qualified for positions in the early phases of the product development defining the appearance of the product. Here, training of software, sketching and modelling techniques for the early phase visualization of products and product ideas will be relevant in the professional role. The graduates may also work with the analysis of products using computational software such as FEA and CFD. They will perhaps plan the manufacturing of the products by simulating the production processes.

The graduates will also be useful in companies that seek to make their product development processed more efficient by visualizing the work-flow and proposing PLM software. They can improve the integration between the product development and the production by proposing or creating software for the integration. The program is also preparatory for a role as PhD students in Universities and institutes. They will in the program get insight in research methods and they will also write a scientific thesis.

Programme Supportive Research

The meaning of the term Product Design JU is a subject that integrates industrial design, product development, material selection and production preparation from idea to use. This has been derived as a subset from the broader research area in JU i.e., industrial product realization. This area contains three sub-areas machine design, material and manufacturing, and production systems.

Machine design
The subject area of machine design includes methods and techniques for the design of mechanical products/components; an essential element of industrial product realization. Particular emphasis is laid on the use of computer-based tools for engineering design. This subject area includes both synthesis and analysis in order to create, optimize and evaluate design solutions with regard to – for example – manufacturability, strength, performance, cost and

environmental aspects. Within this subject area, computer support of various kinds, such as simulation and optimization, are important for the virtual development and verification of products.

Materials and Manufacturing
The subject area of materials and manufacturing focuses on the knowledge of how components, primarily but not limited to cast components, can be designed and manufactured and how the material microstructures and properties of components can be influenced and controlled. This subject area includes experimental methods for material production and characterization, in term of microstructure and properties, as well as modelling/simulation. This research is multidisciplinary and is supported by disciplines
such as physics, fluid dynamics, applied mechanics, solid mechanics, material science, materials technology and chemistry, as well as simulation and optimization. The research approach is to link the different steps, related to product design, from material design to manufacturing technology, including pre and post treatment, to microstructure and final properties. Once linked, these steps can be used as inputs to a localized properties component optimization.

Production systems
The subject area of production systems includes the scientific study of organization, processes, methods and tools, for the manufacturing of physical products and associated services. Focus in the subject area is on development, operation and management of production systems, integrated with other relevant processes in organizations active on regional, national and global markets. Within the subject area theories concerning production engineering, production system development, integrated product- and production development, quality management, logistics and supply chain management, is combined with theories on organization and operations management. Research in the field is based on a holistic view on production and its interaction with the entire product realization process, including the interface with customers and suppliers. Production systems include the technology, people and organization, which co-operatively realizes an identified customer need into products and associated services. A systematic approach is applied, and efforts are made to achieve an understanding and knowledge of central elements of production systems.

Industrial design
The research area mainly deals with two directions. The area for design, focuses on quality assuring of the shape of the surface, which is crucial for how well the design intention is reached and perceived by the end user. The research focuses on different methods of measuring the surface condition and quality assurance of it throughout the product development process. With a unique combination of advanced technical measurement methods and instruments, and affective measurement methods, the surface can be quality assured and verified. The approach through design, handles methods for finding unique innovative solutions to a product's design to meet functional and aesthetic customer and user requirements, as well as being able to manufacture in an industrially sustainable way taking into account the manufacturing company's opportunities and objectives.

Education concept at the School of Engineering

All degree programmes at the School of Engineering at Jönköping University (JTH) follow an education concept. The concept consists of several aspects that must be included in the programmes in order to guarantee quality and appeal as well as their ability to create professionally skilled, in-demand students. The concept places special emphasis on collaboration with industry and internationalisation as two essential tools to develop successful programmes and to attract national and international applicants. Furthermore, all the master's programmes offered by the School of Engineering follow common guidelines that indicate the number of credits per each course (7,5, 15 or 30), the need of cross disciplines courses, and the Industrial

Placement Course as mandatory or elective.

Objectives

After the completion of the programme, students must meet the intended learning outcomes, as described in The Higher Education Ordinance by Degree of Master (1-9), and also the intended learning outcomes as described by JTH:

Common learning outcomes

Knowledge and Understanding

1. 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
2. demonstrate specialised methodological knowledge in the main field of study.

Competence and skills

3. demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
4. 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
5. 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
6. demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and Approach

7. 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
8. demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used
9. demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning

JTH prove ability to embrace interdisiplinary approaches.

Programme-specific learning outcomes

Upon completion of the program, the intended learning outcomes provided for programme must also be met.

Knowledge and Understanding

10. display knowledge of tools and methods in industrial product realization
11. display knowledge on the relations between product design, materials and manufacturing processes and the various stakeholders involved with products.
12. display knowledge on product and production platforms in product realization (Digitalisation)
13. display knowledge of human interaction with products and design methodology and design theory (Design)

Competence and skills

14. demonstrate ability to make life-cycle assessments on cost and sustainability for products
15. demonstrate an ability to use tools and methods in product lifecycle management (Digitalisation)
16. demonstrate ability define and conduct an industrial product realization project.
17. demonstrate the ability to design products with consideration to functional as well as aesthetic values from design intention to product in use (Design)

Judgement and Approach

18. demonstrate ability to assess the validity of the results from product realization projects

19. demonstrate ability to understand product realization processes and propose and evaluate changes for their improvement. (Digitalisation)
20. developed an approach to design knowledge and the ability to reflect from an artistic as well as engineering perspective and developed a stable professional identity. (Design)

Contents

Programme principles

At JU, there are two semesters each year. Fall semester starts the academic year with a duration from mid of august to early January. The spring semester is from January to end of May. There is a summer break from early June to the middle of August. Each of the four semesters encompass 30 credits i.e.,120 credits in total.

The Product Design program consists of 12 courses. Ten of these are 7,5 credits, one is 15 credits, and one is 30 credits (the thesis course). Of the 12 courses, seven are mandatory for all students in the programme. These make up 82.5 of the 120 credits. The rest is elective. However, there are restrictions on what courses that can be selected as electives, depending on the choice of track and the amount and type of mathematics that the student had in the undergraduate education. In addition, the choice of some electives will mean that several electives must be selected as a package. This is described in the next section.

Programme progression

There is one common progression and two different progression tracks for INDUSTRIAL DESIGN and DIGITALISATION.

Common progression

The common progression is mandatory for both tracks and for year one contains the following courses:

- *Integrated product realization*
- *Advanced CAD*
- *Materials in design*
- *Research Methodology in Product Realisation*
- *Project Course*
- *Final Project Work in Product Development*

Programme tracks

First, students must select one of the two tracks INDUSTRIAL DESIGN or DIGITALISATION.

Industrial Design Track

Students who wish to take the INDUSTRIAL DESIGN track should select the Design Philosophy & Practice course in the first segment of year 1. The INDUSTRIAL DESIGN track has the following mandatory courses (elective block 1):

- *Design Philosophy & Practice*
- *Design Methodology in Industrial Design Project*
- *Enterprise Course in Product Design*
- *Realization of Industrial Design Project*
- *Sensation, perception & interaction in Design*

INDUSTRIAL DESIGN track students who have less than 21 credits in mathematics in their

undergraduate education, must take a mathematics course (e.g., Multidisciplinary Optimization) an their elective course to complete the 21 credits requirement. Other than that, the students are free to select any course within the topic, provided that the prerequisites for the course are met.

Digitalisation Track
Students who wish to take the DIGITALISATION track should select the courses (elective block 2):
- *Applied engineering design*
- *Digitalisation and automation in engineering design*
- *Product & production platforms*
- *Production preparation and industrialisation*

Elective courses

Students from both tracks can choose from the following courses (elective block 3):
- *Integrated product and production development*
- *Multidisciplinary optimisation*
- *Foundations of Programming*
- *Polymer and Composite Technology*
- *User Experience Design*
- *Marketing Communication*

Courses

Mandatory courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Advanced CAD	7.5	Product Development	A1N	TACR21
Final Project Work in Product Development	30	Product Development	A2E	TETT23
Research Methodology in Product Realisation	7.5	Production Systems, Product Development	A1N	TFPR22
Integrated Product Realization	7.5	Production Systems, Product Development	A1N	TIPR22
Materials in Design	7.5	Product Development	A1N	TKMR22
Project Course	15	Production Systems, Product Development	A1N	TPJS22

Elective courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Design Philosophy and Practice[1]	7.5	Product Development	A1N	TDPR21
Design Methodology in Industrial Design Project[1]	7.5	Product Development	A1F	TDMS22
Digitalization and Automation in Engineering Processes[2]	7.5	Product Development	A1N	TDAR22
Enterprise course in Product Design[1]	7.5	Product Development	A1F	TEPS23
Foundations of Programming[3]	7.5	Informatics	G1N	TGPG14

Integrated Product and Production Development[3]	7.5	Production Systems, Product Development	A1F	TPUS22
Marketing Communication[3]	7.5		G1F	TMCK18
Multidisciplinary Optimization[3]	7.5	Product Development	A1N	TMOR23
Polymer and Composite Technology[3]	7.5	Product Development	A1N	TPKR21
Product and Production Platforms[2]	7.5	Production Systems, Product Development	A1F	TPDS22
Production preparation and industrialization[2]	7.5	Product Development	A1N	TPBR23
Realization of Industrial Design Project[1]	7.5	Product Development	A1F	TRDS22
Sensation, Perception and Human Interaction in Design[1]	7.5	Product Development	A1F	TSRS22
Applied Engineering Design[2]	7.5	Product Development	A1N	TTKR22
User Experience Design[3]	7.5	Informatics	G1F	TUEK13

[1] Elective block 1

[2] Elective block 2

[3] Elective block 3

Programme overview

Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Integrated Product Realization, 7.5 credits	Advanced CAD, 7.5 credits	*Design Methodology in Industrial Design Project [1], 7.5 credits*	Materials in Design, 7.5 credits
Applied Engineering Design [2], 7.5 credits	*Foundations of Programming [3], 7.5 credits*	*Product and Production Platforms [2], 7.5 credits*	*Digitalization and Automation in Engineering Processes [2], 7.5 credits*
Design Philosophy and Practice [1], 7.5 credits	*Integrated Product and Production Development [3], 7.5 credits*	*Production preparation and industrialization [2], 7.5 credits*	*Realization of Industrial Design Project [1], 7.5 credits*
	Marketing Communication [3], 7.5 credits	*Sensation, Perception and Human Interaction in Design [1], 7.5 credits*	
	Polymer and Composite Technology [3], 7.5 credits		
	User Experience Design [3], 7.5 credits		

Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
Research Methodology in Product Realisation, 7.5 credits	*Enterprise course in Product Design [1], 7.5 credits*	Final Project Work in Product Development, 30 credits	
Project Course, 15 credits			
	Multidisciplinary Optimization [3], 7.5 credits		

[1] Elective block 1

[2] Elective block 2

[3] Elective block 3

Teaching and examination

Throughout the academic year, typically, two courses are taken in parallel. Examination forms and grades are given by each course module, respectively. The programme overview shows the programme structure for both years and may be changed during the programme. For updated programme overview visit http://www.ju.se

Prerequisites

The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in mechanical engineering, civil engineering, industrial design, product development, innovation, production engineering or industrial engineering or equivalent. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

Continuation Requirements

In order to begin the second year, at least 30 credits from the programme's first year must be completed.

Qualification Requirements

To obtain a Degree of Master of Science (120 credits) with a major in Product Development, specialisation in Industrial design, students must complete a minimum of 120 credits in accordance with the current programme syllabus, at least 60 of which must be in the main field of study Product Development and 21 credits in Mathematics.
In addition a Degree of Bachelor of Science in Engineering/Degree of Bachelor of Science or an equivalent Swedish or foreign qualification is required.

Quality Development

The School of Engineering's quality assurance process involves continuous development and quality assurance of degree programmes and courses. This means, among other things, that great importance is attributed to student feedback and that a proactive approach is taken to the development of degree programmes and courses. The quality assurance process is carried out following applicable steering documents.

Other Information

If formal competence is missing, the applicant's substantial competence is tested if the applicant has acquired equivalent knowledge in some other way. The aim is to assess the collective competence and if the applicant has the opportunity to meet selected training. Substantial competence can be about knowledge and experience from working life, long-term mobility or other courses.

Course included in the programme can be read as a separate course, subject to availability. Prerequisites are stated in the syllabus.

Admission is under "Admission arrangements for first and second level" at Jönköping University.

This syllabus is based on "Regulations and guidelines for education at undergraduate, postgraduate and doctoral studies at Jönköping"