



JÖNKÖPING UNIVERSITY  
*School of Health and Welfare*

UTBILDNINGSPLAN  
**Master of Product Development - Specialisation in  
Assistive Technology (MASTech) for Engineers, 120  
högskolepoäng**

Programstart: Hösten 2024



## UTBILDNINGSPLAN

# Master of Product Development - Specialisation in Assistive Technology (MASTech) for Engineers, 120 högskolepoäng

*Master of Product Development - Specialisation in Assistive Technology (MASTech) for Engineers, 120 credits*

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### Examensbenämning

Masterexamen med huvudområdet produktutveckling inriktning hjälpmedelsteknik

Degree of Master (120 credits) with a major in Product Development specialisation Assistive Technology

### Programbeskrivning

#### Background

Assistive devices and technologies are used as a means of maintaining or improving an individual's function and independence and are often key factors in facilitating participation and overall well-being. The range of assistive devices is vast, and examples include wheelchairs, prostheses, orthoses, hearing aids, visual aids and communication devices. Given that many of these devices need to be modified or manufactured to accommodate for individual differences in body function and structure, the process of assessing, manufacturing and fitting assistive devices can be time intensive and costly. Due to a rise in global ageing and an increase in non-communicable diseases (e.g. diabetes), the World Health Organization anticipates that the number of individuals in need of assistive devices will rise beyond 2 billion by 2050.

In order to address the increasing need for assistive technologies it will be necessary to develop new sustainable technologies and to improve the manufacturing efficiency and design of current technologies. This requires a unique combination of knowledge and skills from both the medical and engineering sectors.

#### Post-graduation employment areas

The programme will provide knowledge and skills to work in a number of positions within the assistive technology sector, nationally and internationally. Potential areas of employment could include research and development departments of companies involved in the production of assistive technologies or production management for departments involved in the clinical provision of assistive technologies (including hospitals or private companies).

#### Research

In addition to the aforementioned employment areas, the program also serves as a preparation

for scientific research. Graduates will be eligible for enrollment as Ph. D students at universities or institutes within the areas of product development, health and care sciences or disability research. Examples of research areas include assistive technology product development, materials and manufacturing for assistive technologies, clinical trials of new technologies, biomechanical evaluations of technologies.

### **Programme Supportive Research**

Scientific research from both the School of Health and Welfare and the School of Engineering will support the MASTech. From the School of Health and Welfare, research area that will be represented with the programme include Prosthetics and Orthotics. From the School of Engineering, research areas that will be represented in the programme include Product Development and Materials and Manufacturing.

### **Programme principles**

The development of assistive technologies requires a unique combination of medical and engineering knowledge. The majority of courses will be taken together with students from the MASTech mechanical engineering program. Students from both disciplines are encouraged to work and learn together throughout the programme.

The MASTech will consist of 4 semesters of study (2 years full-time). Courses within the first year of study are campus-based while some courses in the second year of study are web-based and may be completed by distance education.

A fundamental principle of the programme is for students to have the opportunity to link theory to industrial practice. It is particularly important that students apply the knowledge they have acquired during their studies and throughout the programme students will be required to complete a number of projects which require that they solve real-world problems using the theories, models and tools that are introduced in the curriculum. An Industrial placement in the third semester of study will also provide opportunities for students to work closely with industry partners solving real-world problems. To be granted a Master degree (120 credits) students must complete an independent project (thesis) corresponding to at least 30 credits. It is anticipated that students will identify a topic for their independent project in collaboration with industry partners.

### **Teaching and learning philosophy**

The School of Health and Welfare's teaching and learning philosophy allows the individual to freely pursue knowledge and take responsibility for their own learning and personal development. The school aims to equip the individual with the tools needed to contribute to the development of our changing society.

According to the teaching and learning philosophy:

- the learning environment encourages students to actively pursue knowledge and take responsibility for their own learning
- learning processes and modes of assessment contribute to the development of critical thinking and problem-solving skills and promote in-depth learning and understanding
- learning processes promote the development of a professional attitude in interactions with care seekers/patients/clients/users and other professions
- a scholarly approach is an integral part of learning
- industrial placements allow students to observe, analyse, reflect, and gain professional experience and skills.

In practice, the philosophy means that the programmes at the School of Health and Welfare use teaching and learning methods that facilitate the students' learning. Courses must be evaluated

on a regular basis, and the results of the evaluations must be considered when preparing programme and course syllabi and deciding on teaching and learning methods and modes of assessment. The students should take part in this work. The school's management is responsible for regularly reviewing the teaching and learning philosophy.

## **Mål**

### **General objectives**

According to the Swedish Higher Education Act (SFS 1992:1434 with later changes), second-cycle education (60-120 credits) shall be based fundamentally on the knowledge acquired by students during first-cycle courses and study programmes (0-60 credits) or its equivalent. 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.

### **General learning outcomes for a Degree of Master**

After the completion of the programme for a master's degree, students must, according to the Degree Ordinance (Appendix 2, Higher Education Ordinance SFS 1993:100, with later revisions) be able to

#### **Knowledge and Understanding**

- 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 specialised methodological knowledge in the main field of study.

#### **Skills and Abilities**

- 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 one's own 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**

- 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 one's own ongoing learning.

**Programme-specific learning outcomes**

This Master in Assistive Technology program comprises of 120 credits (ECTS) and has a major focus on innovative product development and/or manufacturing of assistive devices for individuals with disabilities. The programme is aimed at contributing knowledge related to product development, design and manufacturing and is specifically targeted towards preparing graduates for a career within the assistive technology industry.

Graduates from the MASTech will have an understanding of medical conditions which typically result in disability and the interactions between people with disabilities and their environment. They will have knowledge and skills required to evaluate the needs of individuals with disability as they participate in their daily lives and to apply this information in the design and manufacture of high quality, robust and sustainable products. Further to this, graduates will also have knowledge and skills to perform clinical trials to evaluate the function and performance of assistive technologies.

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

**Knowledge and Understanding**

A student will be able to:

- argue for the importance of maintaining a user perspective in the design and prescription of assistive technologies and explain how design characteristics of devices may change in different contexts and for individuals with differing impairments,
- compare and contrast various manufacturing processes relevant to the assistive technology industry, and
- explain the principles of design theory with special consideration of assistive technologies.

**Skills and Abilities**

- demonstrate an ability to apply acquired knowledge in practical work,
- demonstrate an ability to collaborate effectively in teams, especially in the presence of a strong multicultural dimension,
- assess individuals to determine their needs for an assistive device and apply appropriate tools to evaluate clinical outcomes associated with use of a device,
- identify problems in device usability and/or productivity and develop innovative solutions to improve manufacturability and sustainability related to the production of assistive technologies, and
- determine if assistive devices and manufacturing processes comply with performance and safety standards and implement mechanisms to monitor and evaluate quality.

**Judgement and Approach**

- demonstrate an understanding of future professional roles, including a sound awareness of ethical responsibilities towards society and the need for economic, social and ecological sustainable development,
- demonstrate an ability to embrace interdisciplinary approaches through the application of a system perspective,
- understand and respect the importance of professional working relationships and the professional expertise of others, and
- demonstrate the ability to evaluate a system based on market demands, societal and social demands and ethical issues.

**Independent project (degree project)**

A requirement for the award of a Degree of Master is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study.

## Innehåll

### Courses within the programme

All courses within the programme are available at advanced level.

### Kurser

#### Obligatoriska kurser

Kursbenämning	Hp	Huvudområde	Fördjupning	Kurskod
Assistive Technology Design	9	Produktutveckling	A1N	HATR21
Co-production in Health and Welfare	7,5	Kvalitetsförbättring och ledarskap inom hälsa och välfärd	A1N	HCPR22
Fundamentals in Assistive Technology	7,5	Ortopedteknik	A1N	HFAR20
Industrial placement	9	Produktutveckling	A1F	HINS21
Innovation Project	7,5	Produktutveckling	A1N	HIPR21
Introduction to Medical Sciences - Bridging Course	15		A1N	HIMR20
Management and Innovation in the Health Sector	6	Ortopedteknik	A1F	HMHS21
Master Thesis	30	Produktutveckling	A2E	HMTV22
Materials and Production Processes	6	Produktutveckling	A1N	HMPR21
Product Realisation	7,5	Produktutveckling	A1N	HPCR20
Quality improvement in Health and Engineering	7,5	Ortopedteknik	A1F	HQHS21
Research Methods and Evidence-based Practice	7,5	Ortopedteknik	A1F	HRMS21

### Programöversikt

#### Årskurs 1

Termin 1		Termin 2	
Period 1	Period 2	Period 3	Period 4
Fundamentals in Assistive Technology, 7,5 hp	Product Realisation, 7,5 hp	Assistive Technology Design, 9 hp	Co-production in Health and Welfare, 7,5 hp
Introduction to Medical Sciences - Bridging Course, 15 hp		Materials and Production Processes, 6 hp	Innovation Project, 7,5 hp

#### Årskurs 2

Termin 3		Termin 4	
Period 1	Period 2	Period 3	Period 4
Management and Innovation in the Health Sector, 6 hp	Industrial placement, 9 hp	Master Thesis, 30 hp	
Quality improvement in Health and Engineering, 7,5 hp	Research Methods and Evidence-based Practice, 7,5 hp		

### Förkunskapskrav

The applicant must hold a minimum of a Bachelor degree (i.e. the equivalent of 180 ECTS credits at an accredited university) in Mechanical Engineering or equivalent. Proof of English proficiency is required.

### Villkor för fortsatta studier

In order to proceed to the second year (third semester) of the program students must have successfully completed a minimum of 30 credits during the first year. To proceed to the fourth semester of the program students must have successfully completed all courses in the first year of study (60 credits) and successfully completed a minimum of 7.5 credits from the third semester of study.

**Examenskrav**

To be awarded the Degree of Master (120 credits) with a major in Product Development specialisation in Assistive Technology, the student must complete all course requirements of at least 120 credits at the higher education level. These credits may not have been used for a previous degree. At least 90 credits must be in second-cycle courses with at least 60 of these second-cycle credits in product development, including a 30-credit master's thesis.

Requirements to complete the programme are (1) completion of the requirements for the Degree of Master (120 credits) with a major in Product Development specialisation Assistive Technology and (2) successful completion of all courses listed under "Contents", or their equivalent.

**Degree certificate**

The degree certificate will be issued after formal application from student, provided that the examination results are registered in the study documentation system.

**Övrigt  
Grade**

In accordance with Jönköping University's regulations, the course syllabus shall specify which grades are used. Grades shall be determined by one of the teachers specifically appointed by the university (the examiner). Grades are awarded according to a target-related 7-point scale: A, B, C, D, E, FX, F. The School of Health and Welfare can make use of an alternative grading system, which is decided by the Dean. In such a case, this will be indicated in the course syllabus.

**Teaching and examination**

For each course in the education there is a special syllabus which is a legally binding document. The teaching and examination forms for the courses given within the program are shown in the syllabus. More detailed regulations and information about examination and grading can be found in the Regulations and guidelines for first, second and third cycle education at Jönköping University in the respective syllabus and respective learning platform.

**Equal Opportunities at Jönköping University**

As an education provider, Jönköping University wants to offer an inclusive study environment where all students are treated in an objective and professional manner, where everyone is given equal opportunities. Jönköping University accepts under no circumstances that discrimination, harassment, sexual harassment and offensive differential treatment occur.

**Disciplinary and Expulsion Committee at Jönköping University**

Students are obliged to follow the regulations governing the activities at Jönköping University. The Disciplinary and Expulsion Committee at Jönköping University can decide on disciplinary measures.

**Credit Transfer**

A student that has passed component parts of a university programme at another Swedish or foreign university, or who has acquired the equivalent knowledge and skills in another way, can following evaluation – receive credits for this within the framework of their studies at the School of Health and Welfare. The application for credit is applied for by the student on a special form according to the instructions on the form. The application must be received no later than five weeks before the start of the course in order to be processed in good time before the start of the course. For students who are new to Jönköping University and who want to take credit for courses close to the start of the course, the application for this must be made as soon as possible after registration.

**Study break**

Study breaks can only be applied for and granted from educational programs, not from courses. A study break can only be granted after the student has completed at least one course with a passing grade, otherwise the student is directed to apply to the program again. Study breaks are requested by the student on a special form and can only be granted due to illness, parental leave, military service or another special reason. A student who has been granted a study break must notify the study counselor of re-entry no later than 15/10 before the spring semester and 15/4 before the fall semester.

**Interruption of studies**

The student is recommended to contact the study advisor before interrupting studies. Cancellation of studies from a program or course is entered by the student according to the instructions.

**Exemption**

When a student does not meet established eligibility requirements before the start of the semester and/or course, exemption is only granted in cases where Jönköping University has caused the student to be unable to complete their studies according to the education plan.

**Business-based training**

When placing before business-based training, the requirements of the business will be taken into account, which may mean requirements for, for example, a health declaration, vaccinations and extracts from the burden register. Business-based training may be located in evenings and weekends.

The School of Health and Welfare may interrupt a student's participation in business-based training or other practical activities during an ongoing course if a student shows gross unsuitability/incompetence when applying one's skills. A student whose business-based training or other practical activity has been interrupted due to gross unsuitability/unskillfulness may not participate in the course again before the course supervisor or examiner has checked and approved that the student has the necessary knowledge and skills. In connection with a decision on suspension, the decision must state the grounds on which the suspension is based. After the decision, an individual plan must also be determined for the student, which must state what knowledge and skill gaps exist, what support the student can count on, how the control will take place, when the first control must take place and when any new controls may take place.

Interruptions at business-based training or other practical activities due to gross incompetence count as a failed opportunity. A student who is judged to have failed three business-based trainingplacements in the same course must interrupt the studies in the relevant education. A student who has failed three times at business-based training must be offered an counseling session with a study counselor.