Master Programme (Two Year) in Technical Textile Innovation

Masterutbildning i textilteknisk innovation

120 credits

Ladok Code: TAMTI
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Level: Second cycle
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General Objectives

Second level education shall essentially build on the knowledge that students acquire in first level education or corresponding knowledge. Second level education shall involve a deepening of knowledge, skills and abilities relative to first level education and, in addition to what applies to first level education, shall

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

(The Higher Educations Act, Chapter 1, Section 9)

Objectives

The master programme in technical textile innovation is designed to suit students with a bachelors or an engineering degree in textile technology. Good knowledge in textile materials and understanding of textile production methods and processes are essential to capitalize the programme. During four semesters, divided into discrete courses, admitted students will further develop their knowledge, skills and judgement ability in textile technological innovation. The didactics and sequence of the courses provide gradual and incremental progression with particular emphasis on textile materials, production methods together with innovation and product development.

All courses offer the students inherent opportunities to excersise their hands-on laboratory skills through assignments with experiments projects where concepts are materialized as proof-of-concept mock-ups. Demands on their scientific communication abilities is gradually rising during the course of the education. The programme, just like the department is characterized by an international and multicultural atmosphere that facilitates a fundamental understanding of the ethical dilemmas and opportunities offered by the textile value chains.

The essence of the programme is to develop the ability to analyze future conditions and to transform contemporary products for future needs in a global perspective. With profound textile technological understanding the students explore the technological opportunities in transdisciplinar contexts while considering social, ecological and economical aspects of sustainable development. These considerations are driving forces for the department's and sister department's research. During the programme's second year the connection between these students and current departmental research is particularly pronounced.

Upon completion of the program, the students shall meet the learning outcomes for a master’s degree set out in the Swedish Higher Education Ordinance (1993:100), which in a textile engineering context reads.

1. Knowledge and understanding

For a master’s degree, the student shall independently be able to:
1.1 demonstrate and apply comprehensive technical knowledge of textile materials, processes and applications, including both fundamental materials and manufacturing theories and methods, and significantly deeper knowledge of the design, construction, development, manufacture and adaptation of innovative textile products,

1.2 demonstrate profound technological and methodological knowledge and deepened insight into current textile technology research and development work,
1.3 demonstrate in-depth understanding of sustainable development aspects including equality and diversity aspects of textile materials selection, design and textile processes during concept and product development, with an articulated cradle-to-cradle perspective,
1.4 account for concepts in confection and production technological processes with profound knowledge in, product development, regulatory aspects and realization, together with comprehensive understanding of sustainable development, functional and quality requirement considerations on textile products.

2. Skills and abilities

For a master's degree, the student shall independently:
2.1 demonstrate an ability to critically and systematically integrate knowledge and to analyze, assess and deal with complex textile technological phenomena, issues and situations, even in cases where limited information is available,
2.2 critically and creatively plan and employ appropriate methods to carry out advanced tasks within given timeframes, quickly obtain new technical knowledge and apply this to textile-related challenges,
2.3 demonstrate an ability to create, analyze and critically evaluate different technical solutions, and to develop and design textile concepts, products, processes and systems, considering individual's different needs and to take society's goals for economically, socially and ecologically sustainable development into account,
2.4 demonstrate abilities to communicate in good English research and development results to laymen, industry and international scholars both orally, in writing and by other means, and
2.5 demonstrate methodological skills required to participate in research and development work or to work independently in other advanced activities.

3. Judgment and approach

For a master's degree, the student shall independently:
3.1 demonstrate abilities to work in a social and organizational context, which involves being able to make assessments, taking into account relevant scientific, social and ethical aspects, and demonstrate an awareness of ethical aspects of research and development work,
3.2 demonstrate insights into the opportunities, limitations and problems offered/posed to society and individuals by science and technology, and take responsibility for how they are used, and
3.3 demonstrate an ability to identify individual needs for and take responsibility of further knowledge development.

Content

The programme starts out with two parallel courses. The course *Creative design processes* introduces and enables practice of creative proocesses for idea generation, both from user and technology development perspectives. The students are introduced to different prototyping methodologies to visualize ideas from product dvelopment processes. The course also prepares for the creative phase of the coming product development and project oriented courses. During the *Advanced fibre and yarn technology* course the students get profound knowledge in man-made and natural sustainable fibres as a basis for further textile processing. Advanced analyses of spinning methods and challenges as yarn spinning of novel sustainable and recycled fibres are conducted during lab assignments as well as effects on adjustements of the mechanical recycling process parameters.

The *Textile product development* course offer students opportunity to apply their prerequicited materials knowledge and design skills acquired during the first study period. Bbased on analyses on user needs they develop product concepts with applications within given textile application domains. The course *Textile product design - construction and joining technologies* aims to deepen the students knowledge in design of 3D textile products. During the course 2D textile structures are joined to form products according to requested technical specification with accompaning verifications.

The autumn semester is wrapped up by the course *Ethics in the textile value chain* that problematizes the textile value chain including the user phase and end-of-life, workforce exploitation, generation and distribution of wealth, material and natural resource utilization along with the sustainable development including gender equality and societal norms.

The course *Advanced textile structures* covers advanced weaving, 3D-weaving and -knitting, braiding, ribbons and nonwoven technologies. Characterization and modelling of those fabrics is also covered. Assignments include textile structures and fabrics recycling. In parallel with the course, the course *Innovative textile product development* runs, which is a creative forward-looking continuation of the former product development course. The project based course faces prooduct development from an innovation perspective of disruptive innovation with its inherent power to transform whole business areas. Also this course problematizes the drivers behind innovation, market pull vs technology push.

The spring semester is finalized with the *Project course in advanced textiles* that offers opportunities to apply knowledge and competences acquired during the programme. The course is based on group pedagogics enabling adressing true challenges. Duuring their assignment the students conduct literature reviews and write technical reports based on analyses of their own

generated data.

The second autumn semester starts by *Advanced dyeing and finishing technologies* that target sustainability and technologies for the future. Simultaneously there is co-reading of *Life cycle assessment* with the master's Programme in Resource Recovery. It is a fundamental LCA course. During the following study period there is co-reading of two courses. *Circular economy* adds further tools to the students abilities for sustainable development from the methods and concepts tought in that domain. These courses together with former project courses forms the stepping stone for the final project course before the thesis project; Project course sustainable development that aims for development of textile products, product lines and systems that that ensures social, ecological and economical dimensions of the development process.

After the autumn semester the students shall be well prepared for the Thesis course that runs throughout the spring semester. A suitable thesis subject is something that has arised during the programme, with scientific and sociatal relevance that touches current research at the department.

Below follows titles of the courses, their extension and what learning outcomes they address, thereby constitute a progression matrix.

Year one (minor adjustments between study periods and years may occur)

1st semester:
Creative design processes (7.5 credits), Learning outcomes 2.4, 2.5
Advanced fibre and yarn technology (7.5 credits), Learning outcomes 1.1-1.2, 2.1-2.2, 2.4
Textile product design - construction and joining technologies (7,5 credits), Learning outcomes 1.1-1.2, 1.4, 2.1, 2.4-2.5
Textile product development (6 credits), Learning outcomes 1.1-1.4, 2.1-2.2, 2.4, 3.1-3.2
Ethics in the textile value chain (1.5 credits), Learning outcomes 1.3, 3.1-3.2

2nd semester:
Advanced textile structures (7.5 credits) Learning outcomes 1.1-1.3, 2.1, 2.3-2.5
Innovative textile product deveopment (7.5 credits) Learning outcomes 1.1, 1.3, 2.4, 2.5
Project course in advanced textiles (15 credits) Learning outcomes 1.1-1.2, 2.4-2.5, 3.2

Year two (minor adjustments between study periods and years may occur)

3rd semester:
Advanced finishing and dyeing technologies (7.5 credits) Learning outcomes 1.1, 1.3, 2.1-2.4
Life cycle assessment (7.5 credits) Learning outcomes 1.1, 1.3, 2.1-2.2, 2.4
Project course in sustainable development (10 credits) Learning outcomes 1.1-3.3
Circular economy (RR) (5 credits) Learning outcome 1.1-1.2, 2.4-2.5, 3.2

4th semester:
Thesis project (30 credits) Learning outcomes 1.1- 3.3

Admission Requirements

Bachelor’s degree in textile technology.
In addition, proficiency in English equivalent to Swedish upper secondary course English 6 is required.

Degree

Following completion of the programme, fulfilling the requirements contained in this syllabus, the student can be awarded the following degree upon application to the University:

The name of the degree is:
Master of Science (120 credits) with a major in Textile Technology

The degree certificate is bilingual (Swedish/English). A Diploma Supplement (in English) will accompany the degree certificate. Degree certificates are issued upon application using the special form. Further information is available at the University’s website.

Degree certificates are issued upon application in Ladok for students. More information is available at www.hb.se.

Student Influence and Evaluation

In order to assure the overall quality of the program, the program's individual courses and the program are assessed. Course assessment procedures follow policies set by the University of Borås regarding course assessment and are shared on the course student- staff interface software. Annual program assessment results are shared with students in IRL-meetings and at the

learning platform. Assessments are essential for a continuous course and program improvement, together with steady protocol improvement, are highly appreciated quality improvement tools.

Students have every possibility to influence their education by direct representation in the board for educations in technology and at the program council board meetings. Together with textile technology professionals the students the proogramme council board offers a platform to discuss their education, its connection to the needs of society evolvement in general and more specifically related to the domain of textile technological innovation.

Miscellaneous

This syllabys is a translation from the Swedish written original.

The language of instruction is English.