HÖGSKOLAN I BORÅS

Master Programme (Two Year) in Textile Engineering
Masterutbildning i textilteknik
120 credits

Ladok Code: TAMSC
Version: 3.0
Level: Second cycle
Approved by: Committee for Education in Technology 2018-03-02
Valid from: Autumn 2017
Valid for:

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

This two-year textile science and engineering programme is intended for students with a bachelor's degree in this particular domain. There are both domestic and international admissions. In order to take full advantage of the syllabus applicants shall be skilled in math, textile manufacturing techniques, textile materials technology and textile chemistry. During four semesters, divided into discrete courses, the admittee's will further develop their knowledge, skills and judgement in textile technology. The advanced level courses, with particular focus on textile materials technology, textile chemistry and textile product design follows an order and pedagogic means that enables both gradual and incremental inherent progression. The syllabus follows a number of streaks. In all courses students work on their hand-on skills by assignments that involve experiments and characterization techniques. Also the student's academic communication abilities are stressed as the requirements increase by every assignment.

The essence of textile technology is to maintain the textile nature, while adding functionality and smartness by various processes. These processes have to handle the requirements posed by the textiles. Hence, the course contents emphasize the process context and also their sustainability issues and opportunities. Environmental concern is a major driver for the department's research activities. In particular during the second year the connection between programme students and departmental research activities is pronounced.

After completing the programme, 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 engineering theories and methods, and significantly deeper knowledge of the design, construction, manufacture and adaptation of advanced and smart textile products,
1.2 demonstrate profound technological and methodological knowledge within at least one such field of textile engineering, as well as a deepened insights into current textile technology research and development work, and
1.3 demonstrate in-depth understanding of sustainable development aspects including equality and diversity aspects of textile materials selection, design and textile processes with an articulated cradle-to-cradle perspective.

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 analyse, assess and deal with complex textile engineering 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, analyse and critically evaluate different technical solutions, and to develop and design textile products, processes and systems, considering individual's different needs and 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 organisational 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 need for and take responsibility of further knowledge development.

Content

The programme starts out with two textile materials technology courses that run in parallel. In the Polymer Technology course the students move their knowledge and skills in polymer physics, polymer chemistry, structure-property relations, processing and applications to advanced level. Knowledge in polymer melt and solution flow properties are essential ingredients to understand man-made fibre and filament production covered in the Fibre Technology course. Filaments are melt spun by the students, mechanically and thermally characterized in a shared laboratory assignment. The two start-up courses also share a focus of sustainability where the environmental impact of natural and man-made fibres and possibilities for reuse and recycling are problematized.
Halfway through the fall semester their melt spun fibres are utilized for integration into structures in the following Composite Technology course that run in parallel with the first part of a Textile chemistry I - Organic and Physical Chemistry, which is the first of a textile chemistry streak that continues throughout the spring semester. Biocomposites and composite recycling are links in the syllabus sustainability streak progression. From a start-up assignment students learn from nature what makes composite materials so great and they go on to composite mechanics, textile preforms and production methods. In the parallel Textile Chemistry I course, the students are introduced to the chemical and physical concepts that describe the structure and interactions of materials. These are essential factors to accomplish strong composites. Furthermore, Textile Chemistry I also provide the students with further insights into colloid and surface chemistry, topics that are strongly related to textile processing. In the Textile Chemistry I and the subsequent Textile Chemistry II - Interfaces and Chemical Treatment courses, the students are faced by a number of basic yet extensive textile chemistry task assignments that address incrementally complex methods to accomplish the desired effect. The reason to go for the more sophisticated processes is the potential for reduced environmental footprint.
As the Textile Chemistry II course with themes on bleaching, dying and printing continues into the spring semester with increasing complexity it first runs in parallel with the course in Textile Product Development where the students has a chance to employ their materials and construction knowledge and skills. Based on user needs they work according to standard protocol to develop product concepts that may be both wearable and technical textiles. The textile chemistry courses not only deal with minimized environmental impact of the processes per se but also explores the conditions needed to reverse dying, printing and functionalization to enable materials recycling. During the second half of the spring semester a course in Textile Electronics and Control Systems that discovers the possibilities to integrate electronic functionality and logic into textile constructions. Principles behind textile resistors, conductors and capacitors are discovered and embedded in interactive systems.
At the start of the second year two parallel courses explore what functionalized and smart textiles have to offer society. Advanced Finishing and Printing with a starting point in the printing part of the chemistry course explores what functionality and smartness that may be accomplished by 3D-scanning and 3D-printing, inkjet printing and supercritical CO2 finishing. In the Smart Textiles course the students explore applications of embedded sensors of different textile electronic principles. Both these courses end up in a shared work shop organized by the students and given for their first year programme peers to appreciate the functionalities and smartness' accomplished by different means. At this stage the programme students should be well prepared for their Thesis Project course that starts half way through the fall semester and runs parallel with the Scientific Methodology for Engineering and Natural Science course, which includes a literature review on the thesis subject, generic and specific research methodology for science and natural science including statistical methods. It runs half way through the spring

semester to support the thesis project that should be related to textile science and engineering. The ideal subject is one that has come up during the course of the programme, which has scientific relevance and relate to 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)
Study period 1:
Polymer Technology (7.5 credits) Learning outcomes 1.1, 1.3, 2.1-2.4, 3.3
Fibre Technology (7.5 credits) Learning outcomes 1.1, 1.3, 2.1, 2.3-2.4

Study period 2:
Textile Chemistry I – Organic and Physical Chemistry (7.5 credits) Learning outcomes 1.1, 1.3, 2.1-2.4
Composite Technology (7.5 credits) Learning outcomes 1.1, 1.3, 2.1-2.2, 2.4

Study periods 3-4:
Textile Chemistry II – Interfaces and Chemical Treatment (15 credits) Learning outcomes 1.1-2.4
Textile Product Development (7.5 credits) Learning outcomes 1.1-1.2, 2.2, 2.4-2.5, 3.1-3.2
Textile Electronics and Control Systems (7.5 credits) Learning outcomes 1.1, 1.3, 2.4-2.5

Year two (minor adjustments between study periods and years may occur)
Study period 1:
Advanced Finishing and Printing (7.5 credits) Learning outcomes 1.1-2.4, 3.1-3.2
Smart Textiles (7.5 credits) Learning outcomes 1.1-3.3

Study period 2-3:
Scientific Methodology for Engineering and Natural Science (15 credits) Learning outcomes 1.2, 2.4, 2.5, 3.2

Study periods 2-4:
Thesis Project (30 credits) Learning outcomes 1.1-3.3

Student already examined from a 15 credit thesis course, as part of a one year master textile engineering programme, will do another 15 credit thesis project instead of the prescribed 30 credit thesis course.

Admission Requirements

Bachelor’s degree 180 credits, in textile engineering or equivalent qualifications. “Equivalent qualifications” means that the applicant should have completed a three-year engineering course including at least 15 credits in mathematics, 7.5 credits in chemistry (with at least half in organic chemistry), 7.5 credits in materials engineering (with at least half in polymer materials), and 15 credits in textile production methods.
Proficiency in English equivalent to:
IELTS (academic training), 6.5 (with no part of the test below 5.5)
or
TOEFL (Internet based): 90 (with a minimum of 20 on the written part)
or
TOEFL (paper based): 575 (with a minimum of 4.5 on the written part)
For further information about English language proficiency requirements, please view: www.hb.se/Englishlanguageproficiency

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:

Teknologie masterexamen med huvudområde textilteknik
The English name of the degree is:
Master of Science (120 credits) with a major in Textile Engineering
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 on a special form. More information is available at www.hb.se.

Student Influence and Evaluation

In order to assure the quality the programme's individual courses and the programme 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 programme assessment results are shared with students IRL-meetings and by the interface software. Assessments are essential for a continuous course and programme 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 programme council board meetings. Together with textile engineering professionals the students are offered a platform to discuss their education, its connection to the needs of society evolvement in general and more specifically realted to the domain of textile engineering.

Miscellaneous

The Swedish document is the original. In the event of any uncertainty in connection with translations into other languages, the Swedish version shall apply.

The language of instruction is English.