

General syllabus for doctoral studies in Textile Material Technology

This general syllabus was established by the Research and Education Board on 23.03.2017. The organisation of doctoral studies in the field of Textile and Fashion follows Research and Education Board guidelines.

Subject description

Textile Material Technology is one of three subjects in the field of *Textiles and Fashion* research. The field of Textiles and Fashion studies those definitions, methods and models that are of importance to the development and application of textiles and fashion in research, industry, and society at large. The field studies the relationships between materials and design variables for function and expression in the development and production of textiles and fashion, as well as the connection between economic and design variables (resources) for function and expression in the production, distribution, and trading of textiles and fashion.

The subject Textile Material Technology is multidisciplinary in nature and combines various scientific disciplines and areas of application. Textile material covers everything from well-known applications in clothing and furnishings to advanced technical products. The research carried out at the University of Borås into textile material technology is therefore characterised in that different technologies can be utilised for societal and industrial applications in which typically advanced and smart materials and innovative processes are central themes.

Research follows the textile value chain and covers natural and synthetic fibres, yarn spinning, weaving, knitting, textile composites, coating, printing, dyeing, 3D structures and textile systems, interface and surface science, polymer technologies, (bio)catalysis, biotechnology, chemistry, digital technologies (inkjet, 2D and 3D printing), nanotechnologies, electronics, photonics and sensor technologies. In addition, there will be a focus on new and innovative processes for the production of such advanced textile materials and products.

Textile material technology also addresses the challenge of minimising the ecological footprint in the production, use and disposal of textiles by taking into account all steps in the value chain to facilitate a circular flow. Everything – from the production of raw materials for fibres, filaments, chemicals for preparation, dyeing, coating, printing, and other process aids, to combinations of intermediate and finishing treatments and laminations – is taken into account in order to identify successful strategies to minimise the ecological footprint along the textile value chain.

The University of Borås also carries out textile material technology research into fibres and textiles from renewable resources, as well as the reuse of fibres via chemical, mechanical, physical-chemical or biotechnological means.

The purpose of doctoral studies in Textile and Fashion

The overarching purpose of doctoral studies in Textile and Fashion is to contribute to societal development and prosperity within the textile sector by meeting the need for trained graduate researchers to fill positions in industry and commerce, academia and the public sector. Characteristic of a doctorate and licentiate in Textile Material Technology is that they have an in-depth knowledge of new and

advanced smart/functional textile materials and their application. This is complemented by an attitude to materials development and utilisation that is sustainable in the long-term, both from an environmental and social perspective.

The doctoral studies in Textile Material Technology are designed to develop:

- the research student's personal competence and communication skills;
- an interest in and knowledge of innovation and entrepreneurship;
- the research student's pedagogical abilities; and
- a personal network, both nationally and internationally.

Collaboration and communication within and outside of academia are essential to achieving these qualities. The doctoral study programme Textile Material Technology is located at the Textile Fashion Centre, providing proximity to, and facilitating collaboration with, a number of different stakeholders, e.g. Borås Science Park, Modeinkubatorn, Borås Textilmuseum, Borås Marketplace and TEKO. Furthermore, the third-cycle study programme in Textile Material Technology requires that:

- the research student works on projects together with other researchers and participates in the group's presentations to interested external parties;
- the research student presents their work at research conferences and also participates at trade fairs such as Techtexil; and
- The research student is provided with the opportunity to work in an international research environment for brief or longer periods.

Goals for general doctoral degrees

The intended learning outcomes for doctoral degrees are stated in the Higher Education Ordinance and regulated in HEO chapter 6 sections 26-27, see Appendix.

The programme's structure

General

Doctoral studies in Textile Material Technology culminating in a Degree of Licentiate cover 120 ECTS equivalent to two years of full-time study. The programme consists of a course component of 40 ECTS and a licentiate thesis of 80 ECTS. A Degree of Licentiate may be an intermediate stage in a doctoral degree.

Doctoral studies in Textile Material Technology culminating in a Degree of Doctor cover 240 ECTS, equivalent to four years of full-time study. The programme consists of a course component of 60 ECTS and a thesis of 180 ECTS.

Supervision

Each research student will be assigned a principal supervisor, as well as one or more assistant supervisors. The principal supervisor must be at least an associate professor, active in the relevant field and permanently attached to the University of Borås. Assistant supervisors must hold a doctorate or, if they are from outside academia, equivalent validated expertise. The principal supervisor must have undergone supervisor training at the University of Borås or have documented equivalent expertise.

Supervisors are appointed by the Research and Education Board's doctoral study programme committee on the recommendation of the director of studies. Principal supervisors should be recommended based on the research student's project and/or subject orientation and be appointed in conjunction with the student's

admission to the programme. Assistant supervisors should generally be appointed at the same time as the principal supervisor unless there are reasonable grounds for a postponement, for example a need to discuss the appropriate competencies, in which case the committee may delay the appointment.

Research students always retain the right to change one or more supervisors. The director of studies should assist any research student wishing to do so; how this is done is regulated in the Vice-chancellor's Decision Document No. 007-16.

Together, the supervisors constitute the research student's supervisory group, with the principal supervisor having responsibility for supervision within the framework of their thesis work. The principal supervisor is also responsible for a) ensuring that the research student is sufficiently supervised, and b) that the timetable for the programme's various elements follows the research student's agreed Individual Study Plan (ISP).

Exceptions may be made to the stated requirements for principal supervisors may be made in cases where the research student is financed by a third party. e.g. pursuing a doctorate while employed by another organisation or as a research student at another university. If the principal supervisor in such a case is external, the Research and Education Board's doctoral study programme committee shall appoint an examiner to take over the principal supervisor's responsibility for the research student's education in accordance with a) and b) above.

Individual Study Plan

An Individual Study Plan (ISP) shall be established for each research student. What should be stated in the research student's ISP is determined by the Research and Education Board (see Doc. No. 300-16). The Research and Education Board's doctoral study programme committee is responsible for ensuring that the ISP template used for research students in Textile Material Technology follows the stated guidelines.

The research student's ISP is drawn up in consultation between the research student and their supervisory group, with the support of the director of studies. Generally, the ISP will contain descriptions of the research student's projects and planned activities (e.g. courses, conferences and extended practical periods) as well as documentation of results (e.g. published articles and conference participation). As a whole, the research student's ISP should provide an adequate description of the progress of their research projects as well as their personal development in line with the programme's intended learning outcomes.

A first version of the research student's ISP must be drawn up and approved by the Research and Education Board's doctoral study programme committee within 3 months of the student's admission. Thereafter the ISP must be continuously followed up. An updated ISP will be determined annually by the Research and Education Board's doctoral study programme committee or in the event of any major changes to the research student's studies, such as a change of principal supervisor or changes to the pace of study. Any deviations from the plan that delay the research student's work should be commented on by the principal supervisor and it is the principal supervisor's responsibility, with the support of the director of studies, to propose measures to keep to the stated timetable.

The composition and suitability of research student's study programme is a matter for the Research and Education Board's doctoral study programme committee (see SOB Doc. No. 1013-14). The committee may instead choose to appoint an examiner in their place to decide on the research student's study programme.

Course component

Doctoral studies in Textile Material Technology culminating in a Degree of Licentiate cover a minimum of two-year net study (120 ECTS) and consist of a course component of 40 ECTS and a licentiate thesis of 80 ECTS.

Doctoral studies in Textile Material Technology culminating in a Degree of Doctor cover a minimum of four-year net study (240 ECTS) and consist of a course component of 60 ECTS and a thesis of 180 ECTS.

In studies leading to a Degree of Licentiate, the focus is primarily on methodology and subject knowledge within the scientific field in question. The Degree of Licentiate also includes course modules in scientific theory and research ethics, with the research student being trained in a critical and scientific communication through course seminars and conference participation. In the programme's later stages, the focus is on the development of research questions and theory within the scientific work's theme and on further developing the research student's ability to take an analytical and critical approach. Here, the research student may also choose to develop their abilities in areas such as higher-education pedagogics and project management via the range of doctoral general courses offered at the University of Borås

The courses to be included in the research student's studies are planned individually and depend on their background knowledge and specific needs. The doctoral student's ISP states the courses that must or can form a part of their studies, as well as how many ECTS each course is worth. The composition of courses is determined by the Research and Education Board's doctoral study programme committee, or by the examiner appointed by the committee for the research student. Doctoral courses in the following subjects are obligatory:

For a Degree of Licentiate:

- Scientific Theory, minimum 5 ECTS.
- Research Ethics, minimum 2.5 ECTS.
- Quantitative methods, minimum 7.5 ECTS.
- Processes for Advanced, Functional Smart Textiles/Materials, minimum 7.5 ECTS

For a doctoral degree, the following is also required:

- Advanced Scientific Theory, minimum 2.5 ECTS.
- Academic Writing, minimum 5 ECTS.
- Advanced course in Processes for Advanced, Functional Smart Textiles/Materials, 7.5 ECTS.

Exceptions from the compulsory courses can be made if the education is given within the framework of an education cooperation or, if other very special reasons exist. If such circumstances exist, the Research Education committee must approve these deviations and the courses to be substituted shall be regulated in the PhD student's ISP.

Available courses are always posted on the University's website for doctoral studies. Research students also have the option to take courses at other educational institutions.

Recognition of previous education

A research student who has successfully completed elements of studies in the same or closely related subject at a national university, may have all or part of these recognised. A research student may also be entitled to have their doctoral studies at a foreign educational institution recognised. Issues regarding the recognition of previous studies are prepared by the director of studies for a decision by the Research and Education Board's doctoral study programme committee, or by the examiner appointed by the committee for the research student. Decisions on recognition are taken in conjunction with the approval of the first version of the research student's ISP. Previous studies that are to be recognised in a commenced doctoral study programme will be listed in the ISP under a separate heading.

Inclusion of second-cycle ECTS

Research students may also seek recognition of courses at masters-degree level. The Research and Education Board's doctoral study programme committee, or the research student's appointed examiner, shall examine both the appropriateness of including any second-cycle courses as well as the proposed scope of the course credits. For doctoral studies in Textile Material Technology, no more than 15 ECTS may be taken from studies at master level.

Course examiner

Courses that form a part of doctoral studies must have a course examiner appointed by the Research and Education Board's doctoral study programme committee and an approved written course plan. Professors and associate professors who are active within the relevant fields and are permanently attached to the University of Borås may act as examiners for doctoral courses in Textile Material Technology.

For courses that the research student has taken at another educational institution, the director of studies may be appointed as examiner, on condition that the course examiner at the institution at which the course was held at least holds the position of associate professor and that there is an approved course plan at the educational institution. Otherwise, a course examiner must be appointed and a course plan approved, as per the previous paragraph.

Scientific study

The programme includes a scientific study to be documented in either a licentiate thesis of 80 ECTS or a doctoral thesis of 180 ECTS. If the licentiate thesis forms an intermediate stage in a doctorate degree, then the equivalent 80 ECTS are included in the 180 required for a doctoral thesis.

Licentiate thesis

A licentiate thesis must be designed either as a compilation thesis or as a coherent work in the form of a monograph. A compilation thesis should take the form of brief summary of at least one scientific study that the research student has authored. This scientific thesis must be of a quality that equates to the demands for publication in a recognised, peer-reviewed scientific journal. The research student's contribution should be clearly identified in the event that the included scientific publications have more than one author. The licentiate thesis should also include an account of any other studies that the research student has participated in during their studies.

The licentiate thesis, and the research carried out for the study, shall be presented at a public seminar, the time and place of which must be notified no later than three weeks in advance. During this period, the thesis must be available for review at the University. Grades (*pass* or *fail*) are decided by an examiner appointed by the Research and Education Board's doctoral study programme committee. Professors or associate professors who are permanently attached to the University of Borås may be appointed as examiners for licentiate theses. Two reviewers with a doctorate or higher, one of whom is qualified in a different field, will attend the licentiate seminar.

Doctoral thesis

A doctoral thesis must be designed either as a compilation thesis or as a coherent work in the form of a monograph. A compilation thesis must include essays to which the research student themselves makes a significant contribution. This scientific thesis must be of a quality that equates to the demands for publication in a recognised, peer-reviewed scientific journal. The abstract (the summarising section) must include an introduction to the research field and a presentation and discussion of the results obtained in the scientific study. The abstract should be written as a stand-alone text and should contain a discussion of the results obtained in relation to the research field as a whole.

A doctoral thesis must be defended in a public disputation, instructions for the preparation and execution of which are contained in the University of Borås pre-disputation guidelines (Doc. No. 008-16). Grades (*pass* or *fail*) for doctoral theses are decided by the examining committee, whose decision is announced after deliberations in conjunction with the disputation. The examining committee is appointed by the

doctoral studies committee prior to each disputation in accordance with the University's disputation implementation guidelines (Doc. No. 773-14).

No later than three months prior to the planned disputation, the main results of the doctoral study shall be discussed at a final review. The Research and Education Board's doctoral study programme committee appoints reviewers to examine the research student's work at the final review, based on the recommendation of the student's supervisor. A research student within the same subject may be appointed as an assistant reviewer.

Entry requirements, selection and admission.

Basic entry requirements

The basic entry requirement for doctoral studies is that the applicant has

- 1) a degree at master level
- 2) completed course requirements totalling at least 240 ECTS, 60 of which must be at master level
- 3) in some other way obtained generally equivalent knowledge, whether inside or outside the country.

The University, through the doctoral study programme committee, may permit an exemption from the general entry requirements for an individual applicant, if there are special grounds, Higher Education Ordinance c. 7 s. 39 (2010:1064). See also University of Borås guidelines for doctoral studies (Doc. No. 866-13).

Specific entry requirements

The specific requirements for entry to doctoral studies in Textile Material Technology at the University of Borås are as follows: The applicant's degree is in a field with sufficient connection to the doctoral subject. It is for the Research and Education Board's doctoral study programme committee to decide whether the applicant has the necessary qualities to succeed in the doctoral studies programme.

Overseas applicants whose native language is not English or a Scandinavian language will generally be expected to pass an English language test, e.g. TOEFL 575 (paper-based) or TOEFL 100 (internet-based), prior to admission.

Selection and admission

Selection to doctoral studies is based on adjudged ability to benefit from the same. The Research and Education Board's doctoral study programme committee appoints an assessment panel prior to each recruitment. The assessment is made on the basis of submitted application documentation and interviews with the most-qualified applicants. A gender-equality perspective will also be applied.

The ability to benefit from the program is mainly assessed based on academic performance at bachelor and master levels. Here the following is given particular consideration:

- Knowledge and expertise relevant to the subject and thesis work.
- Adjudged self-reliance. Such assessments may, for example, be made during interviews through discussion of the applicant's implementation and experience of degree work or some other project appended to their application.
- The ability to communicate in writing and verbally in English and Swedish.
- Other experiences, such as professional experience, that may be relevant for doctoral studies.

However, the fact that an applicant is considered able to transfer credits from prior courses and study programmes or for professional or vocational experience may not alone give the applicant priority over other applicants, Higher Education Ordinance c. 7 s. 41 (2010:1064). Otherwise, the admission of research students follows the University's local guidelines for admission procedures for doctoral studies.

Degree requirements

Doctoral studies culminate in a doctoral degree or, if the research student so desires or such has been stated in the admission decision, with a Degree of Licentiate. The student also has the right, but not the obligation, to pursue the licentiate degree as a stage in doctoral studies.

A Degree of Licentiate requires:

- Passes in courses giving at least 40 ECTS
- A pass for a scientific study the scope of which equates to at least 80 ECTS and which has been defended at a public seminar.

A Degree of Doctor requires:

- Passes in courses giving at least 60 ECTS
- A pass for a thesis the scope of which equates to at least 180 ECTS and which has been defended at a public disputation.

Exams that form a part of doctoral studies will be assessed by one of the grades *pass* or *fail*.

Degree title

Doctoral studies in Textile and Fashion lead to the following degrees:

- Degree of Doctor of Philosophy in Textile Material Technology
- Degree of Licentiate in Textile Material Technology

Effective date and transitional provisions

The previous General Study Plan (Doc. No. 777-14) ceases to apply for research students admitted to doctoral studies after 15.12.2016. By agreement between research students and supervisors, the present general study plan may constitute the governance document for research students who have already been admitted. It should be stated in each research student's ISP which general study plan is being followed by the student.

Other provisions

Resources permitting, research students participate in bachelor courses and study programmes, e.g. by supervising, teaching and assisting in laboratory work. The scope of this participation may not exceed 20 percent of their total time.

Otherwise, the general provisions established by the University of Borås relating to doctoral studies shall apply; regulating matters such as employment, approved leave and research student rights. Current regulations are available at www.hb.se

Appendix -- General intended learning outcome

Knowledge and understanding

For a Degree of Licentiate, the research student shall demonstrate

- knowledge and understanding within their field and current specialist knowledge in a limited area thereof.
- in-depth knowledge of scientific methodology in general and of their specific research field in particular.

For a Degree of Doctor, the research student shall demonstrate

- a broad knowledge and systematic understanding of their field and in-depth and up-to-date specialist knowledge in a limited area thereof.
- familiarity with scientific methodology in general and specifically within their own field.
- deep insight into their field's critical knowledge requirements.

Skills and capabilities

For a Degree of Licentiate, the research student shall demonstrate

- the ability to critically, independently, creatively and, through thorough research, identify and formulate the relevant questions; to plan and, using adequate methods, undertake a limited research project and other skilled tasks within a given period of time, thereby contributing to the development of knowledge and to the evaluation of this work.
- the ability in both national and international contexts, to verbally and in writing clearly present and discuss research and research findings in dialogue with the scientific community and society in general.
- the ability to collaborate with working professional specialists within the field and such skills as may be required to independently participate in research and development and to work independently in other skilled activities.

For a Degree of Doctor, the research student shall demonstrate

- the ability to scientifically analyse and formulate, as well as to independently critically review and assess new and complex phenomena, questions and situations; to critically, independently, creatively and with scientific exactitude identify and formulate questions; to plan and, using adequate methods, carry out research and other skilled tasks within given time limits and to review and evaluate such work.
- the ability to identify the need for further knowledge and demonstrate the characteristics required within both research and education, as well as in other skilled professional contexts, to contribute to societal development and to support the learning of others.
- the ability in both national and international contexts, to verbally and in writing present and discuss with authority research and research findings in dialogue with the scientific community and society in general.
- the ability to collaborate with working professional specialists within the field.
- the ability to significantly contribute through your own research to the development of knowledge within your field with a scientific study.

Judgement and approach

For a Degree of Licentiate, the research student shall demonstrate

- the ability to make ethical judgements relating to their own research.
- insight into the possibilities and limitations of science, its role in society and people's responsibility for how it is used.
- an understanding of and ability to participate in multidisciplinary collaborations.

For a Degree of Doctor, the research student shall demonstrate

- intellectual independence, scientific integrity and the ability to make ethical judgements regarding research.
- in-depth insight into the possibilities and limitations of science, its role in society and people's responsibility for how it is used.
- an understanding of and ability to participate in multidisciplinary collaborations.