UNIVERSITY OF BORÅS

Advanced Finishing and Printing
Avancerad beredning och tryck

7.5 credits
7.5 högskolepoäng

Ladok Code: AT2AB1
Version: 1.0
Established by: Committee for Education in Technology 2018-06-20
Valid from: Autumn 2018

Education Cycle: Second cycle
Main Field of Study (Progressive Specialisation): Textile Engineering (A1F)
Disciplinary Domain: Technology
Prerequisites: Polymer Technology 9 credits, Textile Chemistry I - Organic and Physical Chemistry 7,5 credits and Textile Chemistry II, Interfaces and Chemical Treatment 15 credits
Subject Area: Textile Technology
Grading Scale: Seven-degree grading scale (A-F)

Content

The Advanced finishing and printing course starts from the fundamental knowledge and skills acquired in Textile Chemistry I, II and explores further the functionality and smartness that may be accomplished by resource efficient textile processes such as inkjet printing, 3D-printing, supercritical carbon dioxide-finishing and 3D-body scanning. This course will bring the student further to study the state-of-the-art development in the printing and finishing technologies that highlight the aspect of sustainability, resource efficient process, mass-customization and local production.

Inkjet printing, 3D-printing, and supercritical carbon dioxide-finishing are novel deposition technologies that have high potential for the resource efficient textile processes. In inkjet printing, the focuses of the course are the fundamental understanding of the ink formulation, inkjet printing processes and machinery. In the 3D printing, the polymer filament is melted and deposited on the textile. Therefore, the 3D printer can be used as a patterning tool for 2D deposition of materials on textile. The focus in 3D printing is to functionalize or bring smartness to the textile. In supercritical carbon dioxide-finishing, the focus is using water-free dyeing of textile using carbon dioxide. All the above mentioned deposition technologies can be combined with 3D body scanning to achieve customization in sampling.

Advanced Finishing and Printing emphasizes on the critical thinking, hand-on practices as well as scientific reporting. The Lab sessions and workshops give students the opportunity to practice their skill and work more independently in the domain.

Learning Outcomes

Knowledge and understanding:
1.1 explain concepts relevant in the field of novel resource efficient textile processes such as 3D-printing, inkjet printing and supercritical carbon dioxide-finishing,
1.2 describe how these technologies can be applied to modify textile properties and its application in functionalization and finishing of textiles,
1.3 give a thorough description and understanding of: i), ink formulation, inkjet printing process and machinery, ii), 3D printing process, adhesion between printed filament and textile substrate, iii) state of supercritical carbon dioxide-conditio,
1.4 account for the benefits of impact of resource efficient textile processes, together for with 3D body scanning, to the concept of sustainable development, mass-customization and local production in textile,

Skills and abilities
2.1 characterize relevant physical properties of the fluids that are added in the current processes,
2.2 critically apply acquired knowledge to interpret state-of-the-art literature in the resource efficient textile processes,
2.3 select appropriate materials, processes and evaluation methods within above-mentioned topics and independent problem-solving skills in a laboratory environment,

2.4 analyze the need for and choose among existing technical solutions or if needed adjust them to bring functionality and/or smartness to the textile products,
2.5 write scientific reports in good English and communicate results as prototypes to laymen, industry and researcher,
2.6 work in a group to collaborate and communicate with group members,

Judgment and approach
3.1 discuss the opportunities, limitations and problems of each resource efficient textile process, and take responsibility for how they are used,
3.2 reflect on individual needs in mass-customization and society's goals for economically, socially and ecologically sustainable development,
3.3 reflect on ethical aspects of research and development.

Forms of Teaching

The course is based on project based learning pedagogy and consists of the following forms of teaching:

- Lectures
- Laboratory work
- Project work

The language of instruction is English.

Forms of Examination

The course is examined through the following examinations

Laboratory work
Learning Objectives: 1.1-2.6
Higher Education Credits: 3.0
Grading: Fail, Pass

Workshop
Learning Objectives: 1.1-3.3
Higher Education Credits: 4.5
Grade scale: Seven-degree grading scale (A-F)

Examination "Workshop" determines the final grade of the course, provided that other examinations have the lowest grade pass (G).

Student rights and obligations at examination are in accordance with guidelines and rules for the University of Borås.

Literature and Other Teaching Materials

Korvink J., Smith P, and Shin D., Inkjet-based Micromanufacturing, WILEY-VCH, 2012
Magdassi S. The Chemistry of Inkjet Inks, Word Scientific, 2010

Additional literature concerning supercritical CO2 dyeing and 3D printing will be made available on the learning platform.

Student Influence and Evaluation

Students' opinions are collected systematically and regularly through written evaluation after completing the course. Once per semester, student representatives evaluate courses completed with the director of studies and the course leader. Otherwise, refer to the university's policy for course evaluations and documents issued by the board of directors, the director of studies and the course coordinator.

Miscellaneous

This course is primarily a programme course in the Master programme in textile engineering.

This syllabus is a translation from the Swedish original.