

Textile Chemistry II, Interfaces and Chemical Treatment Textilkemi II, Gränssytor och kemisk behandling

15 credits

15 högskolepoäng

Ladok Code: AT2GK1

Version: 2.0

Established by: Committee for Education in Technology 2017-12-15

Valid from: Spring 2018

Education Cycle: Second cycle

Main Field of Study (Progressive Specialisation): Textile Engineering (A1F)

Disciplinary Domain: Technology

Prerequisites:

Subject Area: Textile Technology

Grading Scale: Seven-degree grading scale (A-F)

Content

The course consists of three course modulus; Surface chemistry (5.5 hp), Chemical treatment of textiles (7.5 hp) and Nanotechnology (2 hp).

In the surface chemistry module the students will learn and understand surface chemistry concepts and why they are relevant in textile engineering. Examples of relevant concepts are the production and cleaning of dispersed systems, the structures of surface-medium interfaces including surface charging and double layers, steric stabilization of colloid systems, surface tension and properties of water-soluble surfactants.

Following a variety of examples of chemical treatment of textile, the Chemical treatment of textiles focuses on recent developments in pre-treatment, dyeing, printing and functionalization of textile fibers and surfaces. The course module emphasizes on the novel strategies using functional materials and enzymes biotechnology for the treatment of textile. The examples include chemical softening, water-, oil- and dirt- repellent finishing, flame retardant finishing, anti-static finishing, anti-microbial and anti-odor finishing

The module discusses the current legislation concerning the use of chemicals and chemical processes in the treatment of textiles, which has great impact on health, environment and sustainable development of society.

The recent development of nanotechnology influences the traditional way of thinking and methodology about functionalization and finishing of textiles. Following the basic concept of nanomaterials and nanotechnology, size dependent effect, application and preparation of nanomaterials, the Nanotechnology focuses on the application of nanotechnology within textile treatment, e.g., deposition of nanoparticles, coating with nanocomposites.

Textile Chemistry II emphasizes on the hand-on practices as well as writing of scientific reports. The Lab sessions related to the surface chemistry, dyeing, printing and finishing of textile, application of nanotechnology in textile finishing etc. are embedded in the course content.

Learning Outcomes

On completion of the course, the student should be able to:

Knowledge and understanding:

1.1 describe concepts that are relevant in surface and colloid chemistry, describe phenomena that arise at interfaces and in dispersed systems and how this technology can be applied to modify textile properties.

1.2 describe the concept of nanomaterials and nanotechnology and its application in the functionalization and finishing of textiles.

1.3 show in-depth knowledge and understanding of: i) theoretical and practical applications of surface chemistry for textile applications; ii) chemical treatment of textile treatment; dyeing; printing and functionalization; iii) new development of nanotechnology in textile functionalized finishing.

1.4 Show a deep understanding of the effects of chemicals, enzymes, chemical treatment processes of textiles and application of nanotechnology on health, environment and sustainability according to current legislation.

Skills and Abilities

2.1 Measuring properties relevant to surface and colloidal chemistry, such as surface tension, critical concentration and critical clotting concentration.

2.2 apply critically applied knowledge to interpret the latest literature in the new methods of pretreatment, dyeing, printing and functionalization of textiles. Demonstrate skills in selecting the appropriate materials and processes in the above-mentioned topics and problem solving in a laboratory environment.

2.3 demonstrate the ability to create, analyze and critically evaluate various technical solutions for developing and applying chemicals, enzyme biotechnology and chemical processes in chemical treatment of textiles, taking into account the needs of individuals and society's goals for economic, social and ecological sustainable development.

2.4 demonstrate ability to write scientific reports on good English and ability to communicate results to laymen, industry and researchers.

Forms of Teaching

The course consists of lectures and laboratory sessions.

The language of instruction is English.

Forms of Examination

The course is examined through the following examinations:

Regarding the surface chemistry module:

Exam: Written exam

Learning Objectives: 1.1-2.4

Higher Education Credits: 4.5

Grading scale: E7

Implementation of laboratory work

Learning Needle: 1.1-2.4

Higher Education Credits: 1

Grading scale: UG

Regarding the Chemical Treatment of Textiles and Nanotechnology module:

Exam: Written exam

Learning Objectives: 1.1-2.4

Higher Education Credits: 5

Grading scale: E7

Implementation of laboratory work

Learning Needle: 1.1-2.4

Higher Education Credits: 4.5

Grading scale: UG

When each examination is assessed with a minimum grade E (or G), the final grade is determined by the average grade of the written exam.

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

Literature and Other Teaching Methods

Compendium: Johansson K. and Wall S., Surface and Colloid Chemistry

Schindler W.D. and Hauser P.J., Chemical finishing of textiles, 1st ed., Woodhead Publishing, 2004

Gulrajani M.L., Advances in the Dyeing and Finishing of Technical Textiles, 1st ed., Woodhead Publishing, 2013

Cavaco-Paulo A. and Gubitz G., Textile Processing with Enzymes, 1st ed., Woodhead Publishing, 2003

Nierstrasz V. and Cavaco-Paulo A., Advances in Textile Biotechnology, 1st ed., Woodhead Publishing, 2010

Recommend reading: Shaw D., Introduction to Surface Chemistry, 4th ed., Butterworth Heinemann, Oxford, 1999

If applicable additional material is made available on the learning platform.

Student Influence and Evaluation

The course is evaluated in accordance with current guidelines for course evaluations at the University of Borås, where students' views will be gathered. The course evaluation report is published and returned to participating and prospective students in accordance with the above-mentioned guidelines, and underlies the future development of courses and education programs.

Responsible teachers are responsible for the evaluation as described above.

Miscellaneous

This course is primarily intended for students who have been admitted to the Master's Program in Textile Technology.
This syllabus is a translation from the Swedish original.