



Composite Technology

Kompositteknologi

7.5 credits

Ladok Code: AT2KT1

Version: 2.0

Established by: Committee for Education in Technology 2017-10-20

Valid from: Autumn 2017

Education Cycle: Second cycle

Main Field of Study (Progressive Specialisation): Polymeric Technology (A1N)

Disciplinary Domain: Technology

Prerequisites: Admission to the Master's program in Textile Engineering

Subject Area: Textile Technology

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

Content

The course covers basic aspects of composites and begins with biomimetics where students learn how nature uses composites created through evolution. Learning about different polymers used in composites today, both thermosets and thermoplastics that can be synthetic or biobased, will be an important part of the course. In addition, the course will cover the fibers (both natural and synthetic) used as textile reinforcements. An important part of the course is to deal with how textile reinforcements are structured and manufactured for optimal performance on the composite. Students are working on preparation of textile preforms in 2-D and 3-D, which is then reinforcement in composites manufactured on available equipment. These textile preforms have a major impact on the composite properties, in terms of composite mechanics that are a specific part of the content. The mechanical properties of the textile are governed by structure, material properties and material property compatibility. Various composite production methods, composite characterization and analytics will also be covered. There will also be included examples of composite applications during the course with discussions about their design criteria and strategies. 'End-of-life' of composites are integrated throughout the course.

Learning Outcomes

After completing the course, the student should be able to, with regard to:

Knowledge and understanding

- 1.1. account for the composite constituents and the basics of composite material,
- 1.2. present the current equations for composite mechanics, depending on geometric factors of the reinforcement and its structure,
- 1.3. account for common composite manufacturing techniques and provide an in-depth description of processes based on textile preforms,
- 1.4. discuss environmental benefits with composites and explain different strategies for composite recovery, re-design and recycling,

Skills and abilities

- 2.1. Select the appropriate matrix and reinforcement including preform structure to achieve desired properties,
- 2.2. make reinforcement precepts and utilize knowledge and practical experience in composite manufacturing
- 2.3. perform tests on composites,

Valuation and approach

- 3.1. Assess suitable composite material designs for given applications.

Forms of Teaching

Teaching consists of lectures, calculations, project work and compulsory laboratory work.

The language of instruction is English.

Forms of Examination

The course is examined through the following examinations:

Project work

Learning outcomes: 3.1

Credits: 1.0 credits;

Grading scale: Fail or Passed

Laboratory work

Learning outcomes: 2.1, 2.3

Credits: 1.0 credits

Grading scale: Fail or Passed

Exam

Learning outcomes: 1.1-1.4, 2.1-2.3

Credits: 5.5 credits

Grading scale: ECTS

The exam mark determines the final grade of the course when laboratory and project work is approved.

Re-examination of the laboration is limited to one extra laboratory session during the school year. The next opportunity for re-examination of laboration takes place when the course is given the next academic year.

The lab report will be re-examined the same week as a re-examination for the exam. In order to write the laboratory report, the laboratory work on which the report is based, as stated in the distributed laboratory, is performed.

The student's rights and obligations for examination are in accordance with guidelines and regulations at the University of Borås.

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Literature and Other Teaching Materials

Course literature is in English.

Miravete, A. (1999). 3-D Textile Reinforcements in Composite Materials [Elektronisk resurs]. Woodhead Publishing

Thomas, Sabu & Goda, Koichi (2013). Polymer Composites, Biocomposites [Elektronisk resurs]. Wiley

Adanur, Sabit (1995). Wellington Sears handbook of industrial textiles. Lancaster, Pa.: Technomic Publ.

Adanur, Sabit (2001). Handbook of weaving. Lancaster, Pa.: Technomic Publishing

Student Influence and Evaluation

The course is evaluated in accordance with current guidelines for course evaluations at the University of Borås which state that students' perspectives are to be collected. The course evaluation report is published and made available to participating and prospective students in accordance with the above guidelines and forms the basis for the future development of courses and educational programmes. Course coordinators are responsible for conducting the evaluations as described above.

Miscellaneous

This course is primarily intended for students who have been admitted to the master's program in textile technology.