



Faculty of Health, Science and Technology
Chemical Engineering

Syllabus

Bio-based materials and products

Course Code:	KTAD11
Course Title:	Bio-based materials and products <i>Biobaserade material och produkter</i>
Credits:	15
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has second-cycle course/s as entry requirements (A1F)

Major Field of Study:
KTA (Chemical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2017-09-14, and is valid from the Spring semester 2018 at Karlstad University.

Prerequisites

Upper secondary level Swedish 3 or B, or Swedish as a second language 3 or B, and English 6 or A, or equivalent.

At least 150 completed ECTS credits for the MSc degree in engineering, including the course Bioindustrial Processes, 15 ECTS cr, and the course Chemistry of Products 15 ECTS cr attended, or equivalent.

Learning Outcomes

The aim of the course is that students acquire specialised knowledge of biobased materials and products produced by forest raw materials.

Upon completion of the course, students should be able to:

1. describe the manufacturing process for some products based on forest raw materials,
2. compare products made of biobased materials and non-biobased materials in terms of property and sustainability perspectives,
3. give an account of application areas and the properties of different biobased materials,
4. use and describe test methods for some biobased materials and analyse and interpret the measured values,
5. explain and evaluate how different sub processes in manufacturing affect the properties of biobased materials and products,
6. summarise the most important results and conclusions of research publications in an area relevant to the course,
7. plan, conduct and give an account of a laboratory assignment according to instructions and within given time limits.

Content

The course deals with manufacturing processes, refinement, product properties and product applications in different areas.

The course covers the following areas:

- Paper manufacturing phases
- Coating and conversion of paper and cartoon
- Optical, physical and mechanical properties of paper products
- Production and properties of cellular based materials such as nanofibrillated cellulose, micro crystalline cellulose, cellulose derivative and viscose
- Lignin products
- Biobased packaging and packaging materials
- Biobased plastics
- Material and energy recycling of biobased materials versus non-biobased materials.

Instruction is in the form of lectures, laboratory sessions, study visits and individual literature assignments. Laboratory sessions and study visits are mandatory.

Reading List

See separate document.

Examination

Assessment is based on a written exam, participation in laboratory sessions and study visits, and on a written literature review and lab reports.

Grades

One of the grades U (Fail), 3 (Pass), 4 (Pass with Some Distinction), or 5 (Pass with Distinction) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

Elective course for the MSc in chemical engineering programme.