



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 2024-06-04, and is valid from the Spring semester 2025 at Karlstad University.

Prerequisites

150 ECTS credits completed in a Master programme in Engineering, including Forest Bioeconomy - Processes, Energy and Products, 15 ECTS credits, and registered for Pulp and Paper Technology, 15 ECTS credits, plus upper secondary level Swedish 3 or Swedish as a second language 3 and English 6, or equivalent

Learning Outcomes

The aim of the course is for students to acquire in-depth knowledge of biobased materials and products produced from forest raw materials.

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

1. describe the value-creating manufacturing processes for paper products and other products based on forest raw materials,
2. compare products made of biobased materials and non-biobased materials in terms of

- properties and the three dimensions of sustainable development,
3. give an account of the application areas and 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 in writing, and
 7. plan, carry out, and present laboratory work independently, according to instructions, and within given time limits.

Content

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

The course covers the following:

- Refinement of paper and cardboard products, including conversion.
- Optical, physical, and mechanical properties of paper products.
- Production and properties of cellulose-based materials such as nanofibrillar cellulose, microcrystalline cellulose, cellulose derivatives, and viscose.
- Biobased packaging materials and packaging.
- Biobased plastic materials.
- Material and energy recycling and comparison between biobased and non-biobased materials

Reading List

See separate document.

Examination

Assessment is based on

- a written exam,
- participation in laboratory sessions and written lab reports,
- a written literature review and oral presentation, and
- participation in study visits.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) 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.