Faculty of Health, Science and Technology
Chemical Engineering

Syllabus

Bioindustrial processes

Course Code:	KTAD01
Course Title:	Bioindustrial processes *Bioindustriella processer*
Credits:	15
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has only first-cycle course/s as entry requirements (A1N)

Major Field of Study:
KTA (Chemical Engineering)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2020-03-11, and is valid from the Autumn semester 2020 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, and admission to the Master of Science programme in Chemical Engineering or Industrial Economy (180 ECTS credits), with 30 ECTS credits in Chemistry and 30 ECTS credits in Chemical Engineering completed, alternatively admission to Chemistry (60 ECTS credits) with 30 ECTS credits completed and Chemical Engineering (90 ECTS credits) with 45 ECTS credits completed, or equivalent

Learning Outcomes
Upon completion of the course, students should be able to:
1. give examples of bioindustrial processes used nationally and internationally,
2. give an account of sustainability aspects of bioindustrial processes,
3. discuss how to choose raw materials for a bioindustrial process,

4. explain selected unit operations and unit processes in bioindustrial processes,
5. analyse the environmental impact of bioindustrial processes,
6. critically review resource management in bioindustrial processes,
7. discuss how biorefineries can be developed in the future,
8. plan, conduct, and give an account of laboratory work according to instructions within time limits, and
9. report their own project orally and in writing, defend their own project and peer review another project orally.

Content
In this course, the concept bioindustrial process refers to how biomass can be transformed in industrial processes.

The course comprises
- Basic bioindustrial processes nationally and internationally.
- The historical development of bioindustrial processes.
- Sustainability aspects of bioindustrial processes.
- Selected unit operations in bioindustrial processes, such as for instance evaporation, drying, and extrusion.
- Selected unit processes in bio industrial processes.
- Discussion of the environmental impact of a factory, including questions like the following: How does purification work? How have the environmental demands affected the development of process technology? How are energy systems and the working environment affected?
- Resource management in bioindustrial processes in the perspectives of energy, materials, economy, health, environment, technology, and circular economy.
- Biorefineries today and in the future.

The course includes mandatory laboratory sessions and study visits. Students carry out a project, which is reported orally and in writing, and serve as peer reviewers of another student's oral and written work.

Reading List
See separate document.

Examination
Assessment is based on
- an individual written exam
- attendance at laboratory sessions and presentations completed according to instructions and within time limits
- attendance at study visits
- written and oral report on their own project according to instructions
- peer review according to instructions

If students have a decision from Karlstad University entitling them to special pedagogical 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 Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. Engineering students are awarded a grade on the scale Distinction (5), Some Distinction (4), Pass (3), or Fail (U).

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.