Faculty of Health, Science and Technology
Chemical Engineering

Syllabus

Material and Environment

Course Code:	CKGB5C
Course Title:	Material and Environment *Material och Miljö*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

Major Field of Study:
KTA (Chemical Engineering)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2019-08-27, and is valid from the Spring semester 2020 at Karlstad University.

Prerequisites
60 ECTS credits completed in the Master Programme in Chemical Engineering, or equivalent

Learning Outcomes
Upon completion of the course, students should be able to:
- give a general overview of the structure of metal and polymer materials
- describe the distinguishing features of metal and polymer materials
- explain how material properties are affected by material structure and manufacturing method
- give a general account of the most common renewable polymer materials that are used in the industry or studied in current research
- use basic materials engineering terminology correctly to be able to discuss issues related to materials with experts as well as laypersons

- give an account of recycling processes used for the most common construction materials, and their strengths and weaknesses
- discuss the concept of industrial ecology and apply energy and material balance to social systems
- discuss and analyse concepts and theories in the area of sustainable development, taking into account the dimensions of ecology, society, and economy
- evaluate and problematise various technical solutions for sustainable development
- reflect upon the role of the engineer in relation to sustainable development

Content
The basics of materials engineering:
Basic crystallography, the structure of metal materials, the structure of polymer materials, material defects, the mechanical properties of materials, dislocation theory, phase diagrams, phase changes, crystallisation, recrystallisation, the properties and uses of materials, material testing, manufacturing processes and recycling, biopolymers

Sustainable development:
The concept of sustainable development, reasons for environmental effects, systems thinking and systems analysis, strategies for sustainable development, technical solutions, how to achieve change

Instruction is in the form of lectures, laboratory sessions, and seminars.

Reading List
See separate document.

Examination
Assessment is based on a written exam, laboratory work, and literature seminars. Laboratory sessions and seminars are mandatory.

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 (5), Some Distinction (4), Pass (3), or Fail (U) 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.