Faculty of Health, Science and Technology
Environmental and Energy Systems

Syllabus

Heat and Mass Transfer

Course Code:	EMGB17
Course Title:	Heat and Mass Transfer *Värme- och masstransport*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
KTA (Chemical Engineering)
MEI (Environmental and Energy Systems)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2018-02-06, and is valid from the Autumn semester 2018 at Karlstad University.

Prerequisites
Mechanics with Applications 1. 7.5 ECTS cr., Applied Thermodynamics, 7.5 ECTS cr. and Thermal fluid sciences, 7.5 ECTS cr, or equivalent.

Learning Outcomes
The aim of the course is that students learn basic concepts in the area of heat and mass transfer, that is, the physical connection for heat conduction, heat convection, heat radiation, mass diffusion and mass convection. Students develop skills in solving heat and mass transfer problems.

Upon completion of the course, students should be able to:
- describe and distinguish between the basic mechanisms of heat transfer, heat conduction, heat convection and heat radiation,
- describe and distinguish between the basic mechanisms of mass transport, diffusion and convection,
- analyse the rediation exchange between black bodies and real surfaces regarding heat radiation,
- describe the different functions in different types of heat exchangers,
- use heat transfer coefficient and heat conductivities to dimension heat exchangers,
- estimate the heat transfer coefficient size in convection, condensation and boiling,
- motivate the analogy between heat and mass transfer and perform calculation on linked heat and mass transfer.

Content
The course comprises the following components: Heat transfer, energy balances, heat exchangers,

mass transfer, air-water system, Mollier diagram. The course treats the different mechanisms for heat transfer from a warm to a cold body, conduction, natural and forced convection, and radiation. Combined heat transfer through convection and radiation and the dimensioning of different types of heat exchangers are treated. Also treated are mass transfer from high to low concentration using Fick's law and simple cases of convective mass tranfer. An introduction to linked mass and heat tranfer is provided.

Reading List
See separate document.

Examination
Assessment is based on a written exam.

Grades
One of the grades Fail (U), 3 (Pass), 4 (Pass with some Distinction) or 5 (Passed with Distinction) are 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.