



Faculty of Health, Science and Technology
Chemical Engineering

Syllabus

Heat and mass transfer

Course Code:	CKGB41
Course Title:	Heat and mass transfer <i>Heat and mass transfer</i>
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 2015-10-07, and is valid from the Spring semester 2016 at Karlstad University.

Prerequisites

Completed Master of Science Engineering Programme courses of 70 ECTS cr. Attended courses: Mechanics for Engineers, 7.5 ECTS cr, and Thermodynamics and Basic Energy Engineering, 7.5 ECTS cr, or equivalent.

Learning Outcomes

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

Knowledge and understanding

- describe the basic laws for impulse, heat and mass transfer,
- define the concepts of viscosity, friction factor and resistance coefficient,
- define the concepts of heat transfer: conduction, convection and radiation,
- define the concepts of mass transfer: diffusion and convection.

Competence and skills

- model heat and mass transfer problems using the basic laws of impulse, heat and mass transfer and applying them in the analysis and selection of commonly used chemical engineering equipment,
- apply the basic laws of impulse, heat and mass transfer to describe and dimension pumps and simple pipe systems and heat exchanger.

Content

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

The course comprises the following components: Material balance, viscosity, fluid mechanics, pipe systems, pipe friction, selection of pumps, heat transfer, energy balances, mass transfer, the system air-water.

The course treats the different mechanisms of heat transfer from a hot to a cold body, conduction, free and forced convection and radiation. Bernoulli's equation with terms of loss, loss of pressure in the flow through a pipe system and the concepts friction factor and resistance coefficient. The concepts of system curve and pump curve and methods for selecting pumps and analysing the energy consumption of existing pump systems are also introduced, as are the calculation of mass transfer from high to low concentration using Fick's law and simple cases of convective mass transfer. An introduction to linked heat and mass transfer is provided.

Reading List

See separate document.

Examination

Assessment is based on reports on calculation tasks, conducted laboratory experiments and written exams.

Grades

One of the grades Pass with Distinction (5), Pass with 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.