



Faculty of Health, Science and Technology  
Chemistry

## Syllabus

### Physical Chemistry of Macromolecules D

<b>Course Code:</b>	KEADM1
<b>Course Title:</b>	Physical Chemistry of Macromolecules D <i>Makromolekylers fysikaliska kemi D</i>
<b>Credits:</b>	15
<b>Degree Level:</b>	Master's level
<b>Progressive Specialisation:</b>	Second cycle, has only first-cycle course/s as entry requirements (A1N)

**Major Field of Study:**

KEA (Chemistry)

KTA (Chemical Engineering)

**Course Approval**

The syllabus was approved by the Faculty of Health, Science and Technology 2019-09-13, and is valid from the Spring semester 2020 at Karlstad University.

**Prerequisites**

Admission to the Master programme in Chemical Engineering at Karlstad University with 150 ECTS credits completed in the programme, or registration on 90 ECTS credits in Chemistry with at least 60 ECTS credits completed, 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 to provide basic knowledge of the physical chemistry of macromolecules, including connections to analytical chemistry and biochemistry. The course also gives students

opportunities to develop skills in presenting an individual laboratory project with the help of modern presentation techniques.

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

- give an account of basic theories of the physical chemistry of macromolecules,
- use theories to explain macromolecular phenomena,
- estimate physical parameters using the theories of macromolecular systems presented,
- carry out laboratory tests of macromolecular systems within given time limits,
- study macromolecular phenomena experimentally in a project within given time limits,
- critically and independently identify and formulate research questions for a project,
- carry out basic risk analyses and assess the safety of laboratory work,
- give an account of and explain current issues in the physical chemistry of macromolecules,
- use and review scientific literature in the evaluation of experimental results, and
- give an account of and discuss information, problems, and solutions in dialogue with different groups, orally and in writing.

## **Content**

The course consists of three components: theory, laboratory, and project. The theory component has a duration of about seven weeks of full-time study, while the laboratory and project components together correspond to about three weeks of full-time study. The components run parallel and are partly integrated.

### **Theory**

Instruction is in the form of lectures and exercises. Course content is presented in the lectures and in the exercises students are supported in the practical application of the presented theories.

The course deals with the basic theories of the physical chemistry of macromolecules, diluted and concentrated solutions, interactions, phase transitions, solubility and ion strength effects, basic and applied thermodynamics, a survey of current research areas in the physical chemistry of macromolecules, and experimental methods. The course requires a high degree of individual study.

### **Laboratory**

The laboratory component includes laboratory sessions and is integrated with the theory component. Active participation in laboratory sessions is mandatory. For permission to carry out a certain laboratory task, students have to prepare through reading and processing the instructions for the task and relevant parts of the course literature. Oral presentations may be included. All reports and protocols must be handed in and accepted within three weeks after the end of the course for the results to be registered within the semester. Reports and protocols submitted late will be assessed when time is available, but no later than the next semester.

### **Project**

Students carry out a laboratory task derived from the scientific literature, complete a literature study, and are introduced to software and techniques for presenting a poster. The project is an individual assignment. Field trips to companies, research institutes etc can be included and may entail extra costs for students.

## **Reading List**

See separate document.

## **Examination**

The theory component is assessed on the basis of individual hand-in assignments in the form of essays and calculation assignments.

The laboratory component is assessed continuously on the basis of written or oral laboratory reports. All reports and protocols must be handed in and accepted within three weeks after the end of the course for the results to be registered within the semester.

The project component is assessed on the basis of a poster and an oral presentation.

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 Fail (U), Pass (G), or Distinction (VG) is awarded in the examination of the course, alternatively a grade on the scale Fail (U), 3 (Pass), 4 (Pass with some Distinction) 5 (Pass with Distinction).

### **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 course KEADM1 cannot be included in the same degree programme as the courses KEGCM1, KEADM0, or KEGCM0.

The course may include as many as 15 days of mandatory attendance at Karlstad University.

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.