



**LUNDS UNIVERSITET**  
Lunds Tekniska Högskola

*Course syllabus*

## **Yt- och kolloidkemi** **Surface and Colloid Chemistry**

**KFKN05, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED B/K

**Date of Decision:** 2023-04-18

### **General Information**

**Main field:** Food Technology and Nutrition.

**Main field:** Pharmaceutical Technology.

**Elective Compulsory for:** MLIV1, MLAK1

**Elective for:** B4-l, B4-lm, K4-m, K4-l, N4-m

**Language of instruction:** The course will be given in English on demand

### **Aim**

The aim of the course is to describe technical surface and colloid chemical phenomena at a molecular level.

### **Learning outcomes**

*Knowledge and understanding*

For a passing grade the student must

- understand the basic principles of surface activity and behind the characteristics and functionality of surface active components in disperse systems
- understand and be able to qualitatively describe colloidal interactions between particles and based on that predict colloidal stability or instability
- understand the relationships between macroscopic material properties and microscopic structures

*Competences and skills*

For a passing grade the student must

- quantitatively evaluate the structure, formulations and stability of colloidal systems.
- demonstrate understanding of surface and colloid chemistry and based on that evaluate

technical situations, and be able to propose experimental studies and to suggest solutions.

- be able to perform and evaluate experimental investigations of colloidal functionality in technical systems.
- be able to describe and discuss how basic colloidal principles determine the outcome of a technical process and/or the functionality of a consumer product in written and oral form.

#### *Judgement and approach*

For a passing grade the student must

- form given basic facts be able to value the complexity of a production process relative to its function for the consumer and impact on the internal and external environment
- independently search for and critically examine and evaluate information in scientific papers dealing with colloidal systems

## **Contents**

Surface and colloid chemistry is a knowledge area with numerous applications within all areas of chemical and biotechnological engineering. For instance almost all foods, numerous drugs, biological systems, bacterial suspensions, many polymer materials, all ceramic materials, multiphase processes and most chemical-technical consumer products are dispersions or by other means colloidal.

The course is based on surface-active components. Both synthetic and natural amphiphiles are treated. Different phases (micellar, liquid crystalline and microemulsions) as well as aggregates such as vesicles are studied.

A central concept is interparticular interactions in relation to colloidal stability. The role of surface activity in controlling interactions through adsorption and non-adsorption is discussed in relation to technical functionality in systems like emulsions and foams. The role of surface activity for wetting, filtration, dewetting, and sintering is discussed. A generally important aspect is how the material properties of dispersed systems are influenced by colloidal interactions and surface phenomena's.

The exercise part of the course treat quantitative aspects of the theory as well as problem solving in colloid chemistry. The practicals are aimed to illustrate how different surface and colloidal system might be constructed and work. The practicals are reported in written form. The projects consist of an analysis of surface and colloidal aspects of manufacturing, formulation or application of a consumer product with relevance to the interest of the student. The projects are reported in written and oral form.

## **Examination details**

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** Mandatory reports from the practicals (2), written assignment and mandatory seminar assignment with written and oral reporting. Written exam. Reports from practicals which are passed on the first hand-in will give 1 bonus point on the written exam (1 report) or 3 bonus points (2 reports). Bonus points can not be used to obtain the grade 3. Bonus points are only applicable to the first subsequent written examination. Students who miss a mandatory assignment may have it replaced by a new assignment training the same abilities.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## **Admission**

**Assumed prior knowledge:** The students are assumed to have basic knowledge in general and physical chemistry.

**The number of participants is limited to:** No

**The course overlaps following course/s:** KFK025

## **Reading list**

- Pashley, R; Karaman, M.: Applied Colloid and Surface Chemistry. John Wiley & Sons, 2004, ISBN: 9780470868836. ISBN10: 047086883X.
- Goodwin J.: Colloids and interfaces with surfactants and polymers, an introduction. John Wiley & Sons, 2007, ISBN: 9780470841433.

## **Contact and other information**

**Course coordinator:** Lars Nilsson, [Lars.Nilsson@food.lth.se](mailto:Lars.Nilsson@food.lth.se)

**Course homepage:** <https://www.ple.lth.se/en/>

**Further information:** Teaching: lectures, exercises, laboratory work, written reports, seminars with oral presentations and opposition.