



Faculty of Health, science, and technology  
Physical Chemistry

Ph.D. Course: Physical Chemistry of Polymers (2KEAF40), 4 ECTS credits  
(Polymerers fysikaliska kemi)  
2 October 2017 – 15 December 2017

The course covers basic theories of physical chemistry of polymers, dilute and concentrated solutions, fundamental and applied thermodynamics, amorphous and crystalline states, liquid crystals, phase transitions, elasticity, and polymeric surfaces and interfaces.

Literature: *Sperling, Introduction to Physical Polymer Science, 4<sup>th</sup> ed., Wiley, 978-0-471-70606-9*  
Course leader and examiner: Jan van Stam, Physical Chemistry, Karlstad University.

The course is open to students admitted to a graduate program in chemistry or materials science. Others can be admitted after a special review. The course lectures are given in Swedish with some support in English for those who do not have Swedish as their mother tongue. The course requires a high degree of self-study and is provided as a distance course via It's Learning.

The PhD student who is admitted selects five of the following chapters of the textbook. These chapters represent the student's individualized course. The chapters are:

*Chain Structure and Configuration*  
*Dilute Solution Thermodynamics, Molecular Weights, and Sizes*  
*Concentrated Solutions, Phase Separation Behavior, and Diffusion*  
*The Amorphous State*  
*The Crystalline State*  
*Polymers in the Liquid Crystalline State*  
*Glass-Rubber Transition Behavior*  
*Cross-Linked Polymers and Rubber Elasticity*  
*Mechanical Behaviors of Polymers*  
*Polymer Surfaces and Interfaces*  
*Multicomponent Polymeric Materials*

The course is examined by written assignments. In addition to answers to assignments, the doctoral student gives an oral presentation. The presentation is given at a joint seminar in Karlstad during week 50, 2017. This means that the examination of the course requires one day's presence in Karlstad. The oral presentation should be on a project in the context of the PhD student's own research or application of the course content in own research.

Electronic request for admission is sent to Jan van Stam ([Jan.van.Stam@kau.se](mailto:Jan.van.Stam@kau.se)) by September 1, 2017. The notification shall be annexed with a certificate of admission to PhD studies and a PhD student in another subject than chemistry or materials science should attach an excerpt from the course records of undergraduate and graduate studies. The personalized course content is determined in consultation between the PhD student, the student's advisor and the course instructor after admission.

Welcome!

*Jan van Stam*

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