Course title: Chemical Nanosciences – selectable / ~~regular course~~

Number of contact hours: 60 hours (30h lectures/15h Ex/15h seminar)

ETCS credits: 6

Course description: Students shall be introduced into the principles and forces responsible for structure formation and self-assembly on the mesoscale. The importance of interfaces, weak interactions and entropy effects will be demonstrated. Real world-applications and case studies will be in focus in order to show, that the concepts of nanochemistry and supermolecular chemistry are not abstract and far-fetched, but rather present in a range of common phenomena.

Contents: Introduction into chemical nanotechnology: Definition, scientific and industrial fields of nanotechnology, disciplines involved; Rheology: concepts, rheological models, chemical control, ciscoelasticity; Wetting: concepts, interface chemistry, polar and non-polar interaction, surfactants, models, applications; Nanoparticles: preparation, surface chemistry, colloid chemistry (stabilization mechanisms), doping, applications; Self assembly: lyotropic mesophases, colloidal crystals, membranes; Case studies: among others soft matter, biology, food; Seminar: students are preparing case studies on zhe basis of their own suggestions. Interaction inside the class should be encouraged.

Education effects (P6S_UW, P7S_WG)**:**

Learning outcome: Students are familiar with concepts and techniques using size-dependent properties and elements of supramolecular chemistry. The associated spatial dimensions will be on the nm-scale in most cases. The students develop the skills to follow and understand chemistry-driven control of size-dependent phenomena and applications.

Literature:

1. Hunter: Foundations of Colloid Science
2. Evans, Wenenrström: The Colloidal Domain
3. Dörfler: Grenzflächen- und Kolloidchemie
4. Steed, Atwood: Supramolecular Chemistry
5. Trevena: Statistical Mechanics

Additional literature

1. Cademartiri, Ozin, Concepts of Nanochemistry
2. Lehn: Supramolecular Chemistry

Assessment method: written exam

Prerequisites: Bachelor degree in Chemical Engineering, Chemistry or closely related Topics of Physical Chemistry from a B.Sc.-programme in chemistry, chemical engineering or similar course programmes

Primary target group:

Lecturer: Michael Bredol - Münster University of Applied Sciences