# Lecture Physical Chemistry of Biological Interfaces and Biomaterials

Rainer Müller

53281 Module COSOM-M 5 (Condensed Mater III – obligatory lecture)

53184 Module CHE-MSc-M 12 (Aufbaumodul II – optional lecture)

Biomaterials are materials which are implanted into the living body to restore lost organ or tissue functions, for example heart, liver, bone, cartilage, hip or knee, or act as temporary devices such as bone nails, catheters and artificial blood substitute. They can be also used as delivery vehicles for drugs, hormones, growth factors, or as matrix for the culture of cells resulting in living tissues for Tissue Engineering.

In the lecture we will focus on following topics:

- Metals, polymers and ceramics used for long-term biomedical applications
- Degradable materials and soft materials used for short-term biomedical applications
- Biocompatibility of materials is determined by the surface properties; surface-sensitive characterization methods
- Interfacial thermodynamics with special reference to biological systems
- Electrostatic properties of biological interfaces
- Interfacial interactions
- Adsorption of biopolymers at interfaces
- Properties of membranes and membrane processes
- Physical chemistry of cell and microbial adhesion to surfaces
- Physicochemical principles of antiadhesive/antifouling surfaces
- Colloid and interface chemistry in Tissue Engineering and Drug Delivery