Biosensors

Type: Elective Course			**Workload** 150 h	**Intended for Semester** 5-10	**Duration** 1 semester
1	**Module:** Biosensors: Basic Principles and Applications		**Hours per Week** (2 h Lecture + Exercise)	**Self-study** 120 h	**Credit Points** 5 CP
2	**Teaching Method** Lecture with integrated exercises				
3	**Group Size:** 30 students				
4	**Learning/Course Objectives:** After successful completion of the module/course, students will have: Acquired in-depth knowledge of basic principles of (chemical) biosensing: - Recognition units (antibodies, aptamers, proteins, environmentally sensitive dyes,…) - Affinity, kinetics, and concentrations Learned to distinguish different transduction mechanisms (optical, fluorescence, electrical, electrochemical,...). Gained comprehensive understanding of key biosensor applications (biomedical diagnostics, cancer and immunological diagnostics, point of care diagnostics, environmental sensing, smart implants, food sensors, wearables). Developed quantitative skills in analyzing binding kinetics, concentration ranges and detection limits. Learned to critically evaluate state-of-the-art literature and translate chemical/biochemical concepts into sensor design. Assessed the strengths, limitations, and key performance metrics (selectivity, sensitivity, biofouling, robustness) of various biosensors. Understood translational perspectives (regulatory frameworks, standards, commercialization, patents, quality control, funding opportunities).				
5	**Contents:** a) Basic principles of biosensing (recognition units, signal transduction, affinity, kinetics, concentrations, performance metrics); b) Applications: electrochemical sensors, fluorescent sensors, wearables, biomedical diagnostics, cancer and immunological diagnostics, environmental sensing, smart implants, food sensors.				
6	**Degree Courses:** Bachelor/Master Chemistry, Bachelor/Master Biochemistry or related disciplines.				
7	**Prerequisite(s):** Knowledge of basic (bio)chemistry and physical chemistry.				
8	**Method(s) of Examination:** Written or oral examination. To be announced after 2 weeks within the lecture				
9	**Requirements for Acquiring Credit Points:** Active participation in exercise sub-sessions and successful completion of final examination.				
10	**Significance for Overall Grade:** Weighted according to CPs				
11	**Frequency:** Every winter semester				
12	Lecturer(s): Prof. Sebastian Kruss and external experts on specific topics				
13	**Additional Information:**				