Name of the course	Biochemical engineering
Number of instruction hours	20
Outline of course/module content	Introduction in concepts: biochemical engineering, bioreaction engineering, bioprocess engineering, metabolic engineering, genetic engineering, bioseparation processes. Integrated bioprocesses. Macrokinetics. Bioprocess engineering: the critical times concept, relations between parameters, the optimization sheme. Economic analysis of bioprocesses: components of the cost estimate, process flow sheets, material and energy balances in process design, equipment sizing. Capital cost estimates. Manufacturing cost estimates. Homogeneous and heterogeneous biocatalysis concept. Biocatalysts and biotransformations. Strategy for continuous biotransformation process development. Optimisation of biotransformations processes – Genetic algorithm and EVOP. Development and optimization of processes performed in enzyme membrane reactor and microreactor. Economical and environmental aspects of biotransformation processes. Mathematical modeling of biotransformation processes. Unstructured and structured kinetic models of biomass growth, substrate uptake and product formation. Metabolic flux analysis. ATP balances. Development, optimization and modeling of biotransformation processes with fully integrated separation of products.
Description of instruction methods	Lectures and seminars
Description of course/module requirements	Oral exam