Name of the course	**Modern petroleum refining and petrochemical processes**
Number of instruction hours	20
Outline of course/module content	Advanced refinery processes for better quality of petroleum fuels, both applied properties and ecological characteristics. Processes for reducing emissions by elimination of sulfur and nitrogen compounds and to lower the aromatics in motor fuels. Process engineering aspects; catalyst properties, kinetic and reactor models, new technologies, process optimization. The disadvantages of the existing desulfurization processes, principles of various new approaches, specially hydrodesulfurization, hydrocracking and fluid catalytic cracking as well as the reforming processes. The new design approaches for sulfur removal by selective adsorption and extraction, oxidative desulfurization and biodesulfurization, novel catalysts for ultra-deep hydrodesulfurization under conventional process conditions, new catalyst for low-temperature hydrogenation. Process aspects of decreasing the benzene content in catalytic reforming feed and products in relation to C5-C6 isomerization and aromatics production. Petrochemical industry: the role and importance. Raw materials for the petrochemical industry: petroleum and its products, natural gas, biomass. Methods of treatment of natural gas. The main products and the primary intermediates: hydrogen, carbon monoxide, ethene, propene, butene, and butadiene, benzene, toluene, xylenes, styrene, phenol and acetone; most relevant products of polymer industry: polyethylene, polypropylene, poly (vinyl chloride) and polystyrene. The processes of hydrogenation and dehydrogenation, alkylation and dealkylation. The processes of oxidation, ammooxidation, oxychlorination and hydroformilation. Oligomerization and polymerization processes. Basics of chemical reactions and processes of hydrocarbons conversion: reaction mechanisms, thermodynamics, kinetics, and process conditions. Mass and energy balances. The main production processes: steam reforming, partial oxidation to synthesis gas, thermal and catalytic cracking. Fischer-Tropsch synthesis. Application of separation processes in petrochemical industry. Economical and ecological aspects of chemical procrsses.
Description of instruction methods	lectures, seminars
Description of course/module requirements	seminar, oral exam