Course Title:	**Catalytic reactors in the petroleum and petrochemical industry**
Lecturer:	Prof. Vesna Tomašić, Ph.D.
Course Type:	Elective
ECTS:	6
Total Hours:	30 hours
Content of the Course:	The content of the course is focused on the extension of knowledge about the most important types of catalytic reactors applied in the petroleum and petrochemical industry.
Competences:	Students will be able to analyse the operation of catalytic reactors with regard to the characteristics of reaction systems, process characteristics, reaction rate and operating conditions. They will be able to apply adequate mathematical/numerical methods to estimate the parameters of kinetic models and reactor models and they will acquire the skills required to be able to work in the chemical process industry.
Teaching Methodology:	Lectures, seminars
Course Units:	Overview of catalytic reactors with their application in the petroleum and petrochemical industry, basic characteristics, advantages and disadvantages of particular processes. Deviation from the ideal flow pattern, gradients within the reactor, wetting of the catalyst, wall surface effects, pressure drop, dispersion, mixing, etc. Reaction mechanisms and the reaction kinetics modelling. The classification and selection of reactor models. The description of reactor models, boundary conditions, estimation and/or calculation of key model parameters (effective diffusion coefficient, efficiency characteristics, intraphase and interphase transfer mass and heat transfer coefficients, etc.),model validation. Catalytic hydrotreatment (HDS, HDN, HDO, HDA, HDM, HDAs) –reactor characteristic with regard to individual processes and process conditions; thermodynamics, kinetics, types of catalysts, modelling. Catalytic reforming: division according to the frequency and way of catalyst regeneration, process variables, thermodynamics, kinetics, types of catalysts, modelling. Fluid catalytic cracking: reaction mechanisms, transfer processes, thermodynamics, data acquisition from laboratory reactors, reactor modelling and simulation.
Examination method:	Seminar, oral exam
References:	1. J. Ancheyta, Modeling and Simulation of Catalytic Reactors for Petroleum Refining, John Wiley & Sons, New Jersey, 2011. 2. U. Mann, Principles of Chemical Reactor Analysis and Design – New Tools for Industrial Chemical Reactor Operations, John Wiley & Sons, 2009. 3. M.E. Davis, R.J. Davis, Fundamentals of Chemical Reaction Engineering, McGraw-Hill, New York, 2003. 4. W.D. Seider, J.D. Seader, D.R. Lewin, S. Widagdo, Product and Process Design Principles. Synthesis, Analysis and Evaluation, 3rd ed., John Wiley & Sons, Inc., New York, 2005. 5. A. Jess, P. Wasserscheid, Chemical Technology, Wiley-VCH, Weinheim, 2013.
Course in English	Yes
Quality Monitoring Method:	Course quality and performance monitoring in accordance with the quality management system of the University of Zagreb. Self-evaluation of lecturers and student poll.