

**Course title:** Chemical reactors engineering – ~~selectable~~ / regular course

**Number of contact hours:** 30 hours (15h lectures, 15h exercises)

**ETCS credits:** 3

**Course description:** The first part of the lectures review the elements of stoichiometry for a single chemical reaction and for complex processes, and thermodynamic analysis of chemical processes. Then the fundamentals of kinetic analysis of chemical processes and the methods for determination of rate equations will be given. The second part is focused on the theory of chemical reactors design. It will include the formulation of mathematical models for a batch reactor, a continuously stirred tank reactor, a cascade of tank reactors and a tubular reactor (with plug flow and dispersive flow). Some aspects related to steady-states determination and stability analysis of non-isothermal reactors will be also discussed. The course exercises consist of solving problems related to the topics given during the lectures, including searching for rate equations, reactor comparison and sizing, calculation of the conversion degree of a given process.

**Education effects (P7S\_UW):**

- **knowledge:** student knows the most important types of chemical reactors; he is familiar with the rules of choosing the proper type and design of reactor for single chemical reactions of different order
- **skills:** student can formulate a stoichiometric model of a chemical process; he can determine a rate equation based on experimental data; he can formulate a model of a tank reactor, a cascade of tank reactors and a tubular reactor; he can determine steady-states of the chemical reactors; he can select the right kind of reactor for a given process
- **social:** student is able to work independently and in the group when solving problems related to reactor design; he understand economic and environmental impact of the proper choice of process equipment

**Literature:** [1 ] Levenspiel O. — Chemical reaction engineering, New York, 1999, John Wiley & Sons  
[2 ] Fogler S.H. — Elements of chemical reaction engineering, Upper Saddle River, 2005, Prentice Hall PTR

**Assessment method:** Partial tests and final exam

**Prerequisites:** Knowledge of mathematics, physical chemistry and basis of chemical engineering

**Primary target group:** All specialties students

**Lecturer:** dr inż. K. Bizon, dr inż. S. Skoneczny, Contact person: dr inż. K.Bizon e-mail: kbizon@chemia.pk.edu.pl