CHEMICAL REACTORS ENGINEERING
(4 ECTS) *Compulsory*

Learning outcomes

The aim of the course is to develop and demonstrate knowledge and understanding of the theory of chemical reactors engineering and enhanced skills in formulation and analysis of mathematical ideal models of reactors. The classes aim is to enhance calculation of chemical reaction kinetics and homogeneous reactors.

After you have worked through this course, including lectures and classes, you should be able to:

- Understand fundamentals of chemical reactions (Stoichiometry of single and complex chemical reactions. Thermal effects of reaction. Chemical reaction equilibrium. Reaction kinetics.)
- Understand fundamentals of ideal reactors models and industrial reactors engineering.
- Prediction and calculation of chemical reaction kinetics.
- Calculation homogeneous reactors: flow reactor with stirrer, reactor with piston flow (tubular reactor) and periodically working reactor (batch reactor).

Course main content

Lectures 20 hours
The course includes: Mass balance of reactor. Stoichiometry of elementary and complex reactions. Thermal effects of reaction. Chemical reaction equilibrium. Reaction kinetics. Elements of calculation isothermal reactors and reactors with thermal effects. Distribution of residance time in the reactors. Reactors of liquid-liquid system. Heterogeneous catalysis. Kinetic analysis of contact processes. Pseudohomogeneous and heterogeneous models. Industrial reactors. Flow reactors with mixer and tubular reactors. Fixed, moving and fluidized-bed reactors.

Classes 25 hours
Calculation of current composition of reaction mixture. Determining kinetic equations from experimental data. Design of batch chemical reactors, isothermal continuous stirred tank reactors and isothermal cascades.

Admission requirements**:**

Backgrounds of thermodynamics, principal knowledge of chemical and process engineering.

Literature

1. O. Levenspiel O., **Chemical Reaction Engineering**, John Wiley and Sons. Inc., New York, London 1972
2. J. Szarawara, J. Skrzypek, A. Gawdzik, **Podstawy inżynierii reaktorów chemicznych**, WNT, Warszawa 1991.

3. G.F Froment, K. B. Bisschoff, **Chemical Reactor Analysis and Design**, John Wiley and Sons., New York, 1992

Examination

Classes 50% + exam 50%