

Chemical Reaction Engineering
Undergraduate 3 credit course in Polymer Engineering curriculum
Amirkabir University of Technology

1. Introduction to chemical reaction engineering concepts (definitions of reaction rate, reaction rate equation, kinetics and mechanism; different types of reactions)
2. Kinetics of homogenous reactions (different kinetics models, elementary and non-elementary reactions, molecularity and order of reactions, deriving reaction rate equation from mechanism, temperature dependency of reaction rate)
3. Experimental kinetics study (laboratory batch reactors, differential method for experimental studies, integral method for experimental studies, analysis of variable volume batch reactor data)
4. Design of ideal single reactor for single reactions (batch reactors, CSTR reactors, plug-flow reactors, comparison of different reactors performance)
5. Design of ideal multiple reactors for single reactions (parallel reactors, series reactors, recycle reactors)
6. Design of reactors for parallel reactions (selectivity and yields, batch and plug-flow reactors, CSTR reactors)
7. Design of reactors for series reactions (selectivity and yields, batch and plug-flow reactors, CSTR reactors)
8. Design of non-isothermal batch reactors

References:

- Levenspiel O. "Chemical Reaction Engineering", 3rd ed., McGraw-Hill, 1999
- Fogler H.S. "Elements of Chemical Reaction Engineering", 4rd ed., Printice Hall, 2006
- Missen R.W., Mims C.A. and Saville B.A. "Introduction to Chemcial Reaction Engineering and Kinetics", John Wiley, 1999.
- Smith J.S. "Chemcial Engineering Kinetics", McGraw-Hill, 1983