Name of the course	**Mathematical modelling**
Number of instruction hours	20
Outline of course/module content	The course provides students of chemical engineering and engineering chemistry on modelling concepts and computer software and numerical methods. The course is based on systems view on modelling of chemical engineering processes.
Description of instruction methods	Instruction methods are given as oral lectures in a class room, accompanied with individual problem sessions followed by discussion in a class room, and individual consultations. Each student is required to derive and solve a athematical model based on his/her experimetal data or from literature, calculate model simulation results with tests of model validation and give inclass presentation in a form of 45 minute seminar with discussion in front of the whole class of students..
Description of course/module requirements	The course content is based on exposition of classical methodologies for modelling heat and mass transfer with reaction kinetics by lumped models (ordinary nonlinear equations) and as distrubuted models with partial differential equations. Special emphasis is given on complex behaviour in chemical reactor systems such as steady state multiplicita, bifurcation of steady states, limit cycle behaviour and deterministic chaos in reaction systems. In the modelling of chemical kinetics introduced is the concept of stochastic models and Gillespi method of simulation. Also are given new concepts based on artificial intelligence algorithms of mathematical modelling, chemical process monitoring and process control. Such are the models based on neural networks, fuzzy logic modelling, and chemometric models.