Title:	**Computer simulation of systems and processes**
Lecture hours:	15 lectures + 30 laboratories per semester
Study period: (summer/winter)	Summer/winter
Number of credits:	7
Assessment methods:	Evaluation of projects (codes with simulations done by students) + midterm and final exam
Language of instruction:	English
Prerequisites:	Basic course in higher mathematics, basic skills in programming

Course content:	• Basic definitions and methods used in modeling and simulations
	  ○ Kinds and constitution of models
	  ○ Solution methods
	  ○ Tools used in simulations,
	• Equilibrium systems:
	  ○ Discrete and continuous mechanical systems,
	  ○ Systems in biology, chemistry and economy,
	• Evolution of spatially homogeneous systems
	  ○ Biological systems,
	  ○ Chemical reactors,
	• Transport in discrete systems
	  ○ Flow in networks,
	  ○ Energy exchange systems,
	• Transport in continuous systems
	  ○ Advective, diffusive and dispersive transport,
	  ○ Transport of heat in barriers,
	• Vibrations and wave propagation phenomena
	  ○ Mechanical, biological and chemical oscillations,
	  ○ Waves in continuous systems,
	• Nonlinear systems
	  ○ Percolations, bifurcations and chaos,
	  ○ Fractals,
	• Verification and validation of models.

Learning outcomes:	Knowledge on basic methods of modelining and simulations of systems and processes described by algeabraic, differential and integral systems of equations with examples from engineering, biology, chemistry, economy etc.

Name of lecturer:	Mariusz Kaczmarek- lectures, Katarzyna Kazimierska-Drobny - laboratories
Contact (email address):	mkk@ukw.edu.pl
Literature:	• J. Brzózka i L. Dorobczyński, Programowanie w Matlab, Mikom 1998, • J. D. Murray, Mathematical biology, Springer 1993, (U. Foryś, Matematyka w biologii, WNT 2005), • D.W. Heermann Introduction to the Computer simulation Methods in Theoretical Physics, Springer (D. W. Heermann, Podstawy symulacji komputerowych w fizyce, WN-T 1997), • I. Marczuk, Modelowanie matematyczne problemów środowiska naturalnego, PWN 1985, • D. Potter, Metody obliczeniowe fizyki, PWN 1977 (Potter, D.: computational physics. Wiley, New York 1980). • P. Rudra, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 2002, (MATLAB 7 dla naukowców i inżynierów, PWN 2010), • E. Szucs, Modelowanie matematyczne w fizyce i technice, WN-T 1977,