Study programme(s): Applied Mathematics (MAP)

Course title: SEMINAR WORK IN MODELING (P404)

Lecturer(s): Srboljub Simić

Course status: compulsory on module: Techno-mathematics

ECTS points: 3

Requirements: Differential and Integral Calculus

Learning Objectives

Gaining experience in independent research, acquiring skills for formulation, analysis, and numerical implementation of selected mathematical models applicable to a wide range of real problems. Fostering students' communication skills and team-work capabilities.

Learning Outcomes

Acquiring a solid knowledge of selected principles and methods for formulation and analysis of mathematical models of systems that appear in a wide range of application domains. Students will gain an understanding of the analytical and numerical tractability of the studied models, experience in implementing mathematical models in selected program languages, and effective communication of the obtained results both in oral and written form.

Syllabus

Theoretical instructions

Students will learn how to analyze natural and social phenomena, formulate and set up appropriate mathematical models, validate and compare such models, explain the limitations and deficiencies of the model, choose the best model. The mathematical tools to be covered include dynamic systems, differential equations, optimization, numeric simulations. Selected topics in probability theory, differential equations, etc. will be illustrated through modeling of real problems in the fields of physics, mechanics, biology, medicine, pharmacy, finance, engineering, traffic, and other areas of applied mathematics.

Practical instructions

Students will gain the ability and experience to simulate mathematical models in selected program packages.

Literature

1. Frank R. Giordano, William P. Fox, Steven B. Horton, Maurice D. Weir, **A First Course in Mathematical Modeling**, 5th Edition, Cengage Learning, 2013.
2. Sandip Banerjee, **Mathematical Modeling: Models, Analysis and Applications**, Chapman and Hall/CRC, 2014.
3. Sean Bohun, Samantha McCollum, Thea van Roode, Reinhard Illner, **Mathematical Modelling: A case studies approach**, Student Mathematical Library Book 27, American Mathematical Society, 2004.

Number of active classes	**Lectures: 2**	**Practical teaching: 0**

Teaching methods

Plenary lectures on a given topic followed by independent research work by students with interactive guidance of teachers; workshop form (problem-solving sessions, student teamwork) on the selected real problem. Presentation of student papers followed by discussion.			
Grading (maximum number of points 100)			
Pre-exam obligations	Points	**Final exam**	Points
practical teaching	**70**	oral exam	**30**