Course title	Code No.
Mathematical Modelling and Simulations	

Semester	Course status (mandatory or optional)
2	Mandatory

Lecturer(s)	E-Mail
Milan Batista **Blaž Luin**	**Milan.Batista@fpp.uni-lj.si** **blaz.luin@gmail.com**

Contact hours per week	Credit Points	Workload		
5	6		Presence	Self-study
		Lecture	45	30
		Seminar		
		Practice	30	45
		Laboratory		
		Other		

Media	Teaching aids
Computer, digital projector, whiteboard, network	Presentations (lectures), computing exercises, real life examples

Enrolment requirements and entry competences required for the course

None.

Conditions for permission to take the exam

Completed exercises.

Assessment methods and criteria

Written exam (80%)
Oral exam (20%)

Learning outcomes at the programme level to which the course contributes

To select, compare, organize and use transport data.
To select, compare and use simulation software and computer tools intended for mathematical modelling.

Learning Outcomes

Professional competence	Key skills
▪ Use of different numerical methods in solving practical transport-related problems ▪ Critical evaluation of the results of numerical calculations ▪ Plan a systematic approach to problem-solving ▪ Develop an engineering decision making	▪ Mathematical competences in science and technology ▪ Proficiency in English language ▪ Learning to learn

Applicability in other courses/programs

Content

What is mathematical modelling?
Types of problems and their solution.
Dimensional analysis and similitude modelling. Basic statistics.
Approximation and Validating Models.
Fitting curves to data.
Monte Carlo simulation.
Deterministic models.
Stochastic models.
Optimization.
Preparation and evaluation of experiments.
Exponential growth and decay.
Traffic flow models.
Modelling vibration.
Modelling ship motion.

Literature

F.R.Giordano, M.D.Weir, W.P.Fox – A First Course in Mathematical Modeling, China Machine Press, 2003
C.Dym – Principles of Mathematical Modeling, 2nd edition, Academic Press,. 2004

S.Heinz – Mathematical Modeling, Springer, 2011

Amendment Log			
Version No.:	Date:	Changes:	Name: