Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering	*Institute of Mechatronics and Vehicle Engineering*

Subject title and code:	**Modelling and Simulation BMXMSE2MNF**	**Credits:** *4*
Full-time study	2025/26 *ac. year* 2 *semester*	

The course is available at:	MSc in Mechatronics

Supervised by:	**Andrew Frigyik**	**Instructors:**	**Andrew Frigyik**

Prerequisite (neptun code):	BTXAME1MNF

Weekly number of lessons

Lecture: 2	Group seminar:	Lab: 2	Consultation:

Way of assessment:	Midterm mark	(Oral)

Online consultation *(in case it's required):* ... *(BBB link)*

Edu. goal:	Students will learn the basics of the theory of modeling and simulation used in mechatronics. They will acquire skills to help them apply this knowledge in practice and run systems that facilitate the creation of these kind of models.

Schedule

Education week	Topics
1.	Introduction to modeling and simulation. Why do we simulate? Simulation environment.
2.	Goal of modeling and simulation: when do we need a model and how to get one
3.	Required tools: Review of Linear Algebra, Analysis and numerical tools, and introduction to stochastic methods
4.	Traffic and highways model: Macroscopic simulation I.
5.	Traffic and highways model: Macroscopic simulation II.
6.	Traffic and highways model: Microscopic simulation I.
7.	Traffic and highways model: Microscopic simulation II.
8.	Rector's Day
9.	Traffic and highways model: Stochastic approach I.
10.	Traffic and highways model: Stochastic approach II.
11.	Population dynamics: Role of dynamical systems in modeling
12.	Control Engineering: Basics and example
13.	Fuzzy set theory and rule-based fuzzy system
14.	Chaos theory: Introduction and a simple model

Mid-semester requirements

Test		Assignment to be submitted		Presentations	
amount	dates	amount	deadlines	amount	dates
				3	

According to the HKR attendance of group seminars and lab exercises are mandatory.

Other requirements for participation in sessions not covered by the regulations and restrictions on substitutions:

Test		Assignment to be submitted		Presentations	
maximum points available	minimum score required to pass /test	maximum points available	minimum score required to pass / assignment	maximum points available	minimum score required to pass /lab
…points	…points	…points	…points	100 points	40 points

Total number of points achievable in semester:	100 points

Grading thresholds	satisfactory 40 points and above	average 55 points and above	good 70 points and above	excellent 85 points and above
Other evaluation criteria:				
Receive a signature denied entry:				
Required references:				
Recommended references:	- Bungartz et al. Modeling and Simulation. eBook. ISBN 978-3-642-39524-6. - Mathworks Inc. Matlab 2020a			
Quality assurance methods of the subject:				

Things, that are not included, can be found within the regulations of Óbuda University.