COURSE DESCRIPTION CARD - SYLLABUS

Course name
Agent-based modeling and simulation [S2TIIZM1E>MiSA]

Course

Field of study
Information Technology for Smart and Sustainable Mobility

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
24

Laboratory classes
24

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Basic to intermediate programming experience System modeling or simulation background in transport modeling Skills: Understanding of how systems with many interacting components behave

Course objective

To understand how to model and simulate complex system using an agent-based approach.

Course-related learning outcomes

Knowledge:
The student possesses advanced and in-depth knowledge in the field of transport engineering, including theoretical foundations, tools, and means used to solve basic engineering problems, particularly in the area of transport systems modeling
The student has well-structured and theoretically grounded general knowledge related to key issues in transport engineering, especially in agent-based simulation and tools used for agent-based modeling and simulation.

Skills:
The student is able to use information and communication technologies applied in the implementation of projects in the field of transport systems, in particular, can apply agent-based simulation in transport systems
The student is able to plan and conduct experiments, including computer simulations, interpret the obtained results, draw conclusions, as well as formulate and verify hypotheses related to complex engineering problems and basic research problems
The student is able - in accordance with a given specification - to design a transport engineering system based on agent-based simulation and to implement this project, at least partially, using appropriate methods, techniques, and tools, including adapting existing tools or developing new ones for this purpose

Social competences:
The student understands the importance of using the latest knowledge in transport engineering to solve research and practical problems

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Practical work
Group project by course

Programme content

Concept of agent based simulation and modeling. Macro and micro-simulation. Application to transport.

Course topics

Introduction to the agent approach
Agent-based modeling and simulation principles and process
Agent-based modeling and simulation tools
Application to transport: autonomous vehicles, traffic modeling with inter-vehicles and smart infrastructure communications

Teaching methods

The course is conducted remotely (online) in a synchronous format. Classes may also be held in person.

Bibliography

Basic:
Object Management Group, Business Process Model and Notation (BPMN) (2010)
Ortuzar J., Willumsen L.G. (2011) Modelling Transport, 4th Edition, John Wiley & Sons, New York.
Hensher D.A., Button K.J. (red). (2000) Handbook of Transport Modelling. Elsevier, Oxford.

Additional:
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Breakdown of average student's workload

	Hours	ECTS
Total workload	78	3,00
Classes requiring direct contact with the teacher	48	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00