Road traffic modelling, simulation and control

1. Subject name	Road traffic modelling, simulation and control				
2. Subject name in Hungarian	Közúti járműforgalom modellezése, szimulációja és irányítása				
3. Code	BMEKOKAD016	4. Evaluation type	exam grade	5. Credits	4
6. Weekly contact hours	2 (0) Lecture	0 (0) Practice	2 (0) Lab		
7. Curriculum	PhD Programme	8. Role	Basic course		
9. Working hours for fulfilling the requirements of the subject					76
Contact hours	56	Preparation for seminars	0	Homework	4
Reading written materials	0	Midterm preparation	8	Exam preparation	8
10. Department	Department of Control for Transportation and Vehicle Systems				
11. Responsible lecturer	Dr. Tettamanti Tamás				
12. Lecturers	Dr. Tettamanti Tamás				
13. Prerequisites					

14. Description of lectures

- Road traffic dynamics and traffic parameters.
- Functions and architectures of road traffic control systems.
- Traffic detection technologies: smoothing, filtering, prediction, Recursive Least Square Estimator, Kalman Filter, Moving Horizon Estimation.
- Urban and freeway traffic control: theories, strategies, tools, software.
- Urban road traffic modeling and control: Store-and-forward model, LQ and MPC control design.
- Freeway traffic modeling and control: LWR model, shockwave theory, PID / LQ / nonlinear MPC control design.

15. Description of practices

16. Description of labortory practices

Road traffic modelling and traffic control algorithm realization in Matlab environment.

17. Learning outcomes

A. Knowledge
- organization and functioning of road traffic control systems; levels and methods of traffic modeling; urban traffic management strategies, tools and software; control systems of public transport and highway systems.

B. Skills
- modeling road traffic dynamics; design of traffic measurement and estimation systems.

C. Attitudes
- open to research on traffic management and autonomous vehicles.

D. Autonomy and Responsibility
- independently design road traffic control.

18. Requirements, way to determine a grade (obtain a signature)

Completed homework and successful oral exam at the end of semester.

19. Opportunity for repeat/retake and delayed completion

Possibilities for supplementation takes place in accordance with the applicable study and examination rules.

20. Learning materials

Tettamanti T., Luspay T. and Varga I.: Road Traffic Modeling and Simulation, Akadémiai Kiadó, Budapest, 2019

Effective date	27 November 2019	This Subject Datasheet is valid for	Inactive courses