1. Subject name	**Traffic modelling, simulation and control**				
2. Subject name in Hungarian	Járműforgalom modellezése, szimulációja és irányítása				
3. Code	**BMEKOKAM704**	4. Evaluation type	mid-term grade	5. Credits	**4**
6. Weekly contact hours	**2 (28) Lecture**	**0 (0) Practice**	**2 (28) Lab**		
7. Curriculum	**Autonomous Vehicle Control Engineering MSc (A)**	8. Role	**Mandatory (mc) at Autonomous Vehicle Control Engineering MSc (A)**		

9. Working hours for fulfilling the requirements of the subject				**120**	
Contact hours	56	Preparation for seminars	14	Homework	19
Reading written materials	16	Midterm preparation	15	Exam preparation	0

10. Department	**Department of Control for Transportation and Vehicle Systems**
11. Responsible lecturer	Dr. Varga István
12. Lecturers	Dr. Tettamanti Tamás, Dr. Luspay Tamás
13. Prerequisites	

14. Description of lectures

This subject gives a state-of-the-art introduction to road traffic automation and control. Students become familiar with the basic notions and theories, and get acquainted with the hardware/software architectures of road traffic control systems. Traffic detection technologies, road traffic controllers, as well as traffic control centers and monitoring systems are introduced. An introduction to the traffic modeling and traffic control theories are also provided. The students practice the basics of the traffic modeling through Matlab/Simulink and SUMO traffic simulator.

15. Description of practices

16. Description of labortory practices

Computer lab practices: micro. and macroscopic traffic modeling (MATLAB, SUMO).
Laboratory exercises: estimation of road parameters (smoothing, Recursive Least Square Estimator, Kalman Filter, MHE), model based control design (PID, LQ, MPC).

17. Learning outcomes

A. Knowledge
- is familiar with the structure and operation of traffic control systems
- knows the levels and methods of traffic modeling
- know the traffic management strategies, tools and software for urban transport
- knows the management solutions of public transport and highway systems

B. Skills
- capable of modeling traffic on a given network
- is able to control a given subnet
- is able to use and design a form for measuring and estimating systems

C. Attitudes
- open to research on the joint system of traffic management and autonomous vehicles

D. Autonomy and Responsibility
- can independently design node controls

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

Requirements: successful completion (min. 50%) of the midterm and submission of one homework. Weights of requirements in the mid-term grade: homework (1/3), midterm (2/3).

19. Opportunity for repeat/retake and delayed completion

There is a retake option for the midterm and the homework can resubmitted upon request till the end of delayed completion period.

20. Learning materials

Tettamanti, T. ; Luspay, T. ; Varga, I. Road Traffic Modeling and Simulation Budapest, Magyarország : Akadémiai Kiadó (2019) ISBN: 9789634542957

Effective date	10 October 2019	**This Subject Datasheet is valid for**	2023/2024 semester II