Budapest University of Technology and Economics
Faculty of Transportation Engineering and Vehicle Engineering

1. Subject name	**Transport automation**

2. Subject name in Hungarian	Közlekedési automatika

3. Code	**BMEKOKAM202**	**4. Evaluation type**	mid-term grade	**5. Credits**	**4**

6. Weekly contact hours	**2 (9) Lecture**	**1 (5) Practice**	**0 (0) Lab**

7. Curriculum	**Transportation Engineering MSc (K)**	**8. Role**	**Mandatory (mc) at Transportation Engineering MSc (K)**

9. Working hours for fulfilling the requirements of the subject				**120**	
Contact hours	42	**Preparation for seminars**	8	**Homework**	22
Reading written materials	42	**Midterm preparation**	6	**Exam preparation**	0

10. Department	**Department of Control for Transportation and Vehicle Systems**

11. Responsible lecturer	Dr. Sághi Balázs

12. Lecturers	Dr. Baranyi Edit, Dr. Bede Zsuzsa, Lövétei István

13. Prerequisites	

14. Description of lectures

Basic definitions.
Development of safety-realted systems (concept, system definition, hazard- and risk -analysis, specification of system requirements, architecture and apportionment of system requirements, design and implemetation, manufacture, integration, system validation, system acceptance, certification, authorization).
Failure management of safety-critical systems. Syafety criterias: system requirements, the safety case.
Hazard analysis: FMEA, FMEDA, FMECA, FTA, HTA, HAZOP; hazard analysis during the lifecycle.
Risk analysis. Consequences of the faulty operation - severity. Probability of the faulty operation. Risk classification. Safety Integrity Levels.
Development process of safety-related systems. System lifecycle models and management. Failure management. Human aspects of the safety. Safety analysis. Safety management.
Safety-crtical softwares. Programming of safety-critical softwares. Data security. Program protection Plan. Protection of the RAM.
Safety-critical hardware. Hardware redundancy. Safety strategies.
Formal methods and its application in safety-realted systems.

15. Description of practices

In practices, students must be mastered in hazard- and risk analysis methods (FMEA, FMEDA, FMECA, FTA, HTA, HAZOP).

16. Description of labortory practices

17. Learning outcomes

A. Knowledge
- is familiar with the concepts and mathematical apparatus of safety, and risk analysis
- is familiar with the development methods of safety-critical systems and safety architectures
- is familiar with the numerical descriptive tools of reliability and the related calculation methods

B. Skills
- capable of performing safety calculations based on a specification
- can perform risk analysis calculations

C. Attitudes
- is interested in the safety and risk issues of sifferent transport means

D. Autonomy and Responsibility
- is able to consult in a team in algorithmic and programming tasks, to make independent decision

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

Students must carry out individually a hazard and risk analysis of a designated system.

One midterm exam need to be written. The midterm grade is the average of the results from individual analysis and the midterm exam.

19. Opportunity for repeat/retake and delayed completion

The midsemester exam can be retried once, the individual analysis can be delayed completed.

20. Learning materials

Storey: Safety-Critical Computer Systems Addison-Wesley 1996
Braband, J.: Risikoanalysen in der Eisenbahn-Automatisierung Eurailpress 2005
Lecture Notes

Effective date	10 October 2019	This Subject Datasheet is valid for	Inactive courses