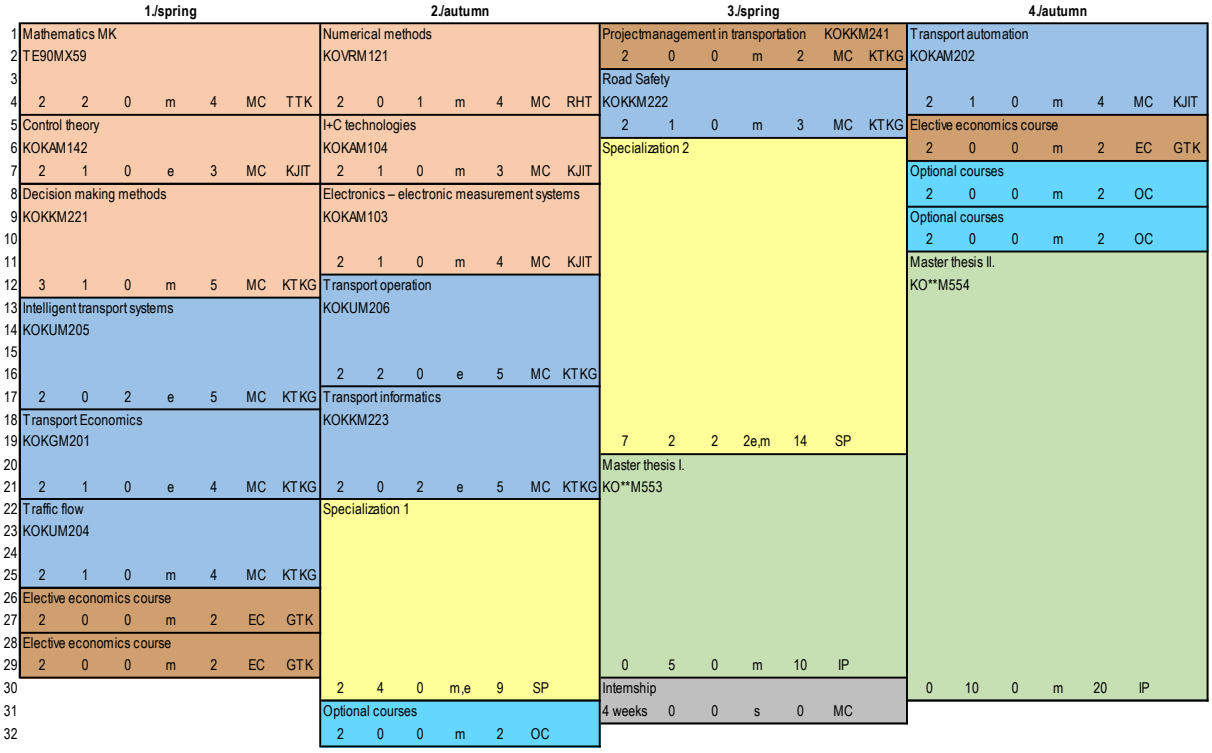
Budapest University of Technology and Economics
Faculty of Transportation Engineering and Vehicle Engineering

Transportation Engineering Master Programme
Curriculum

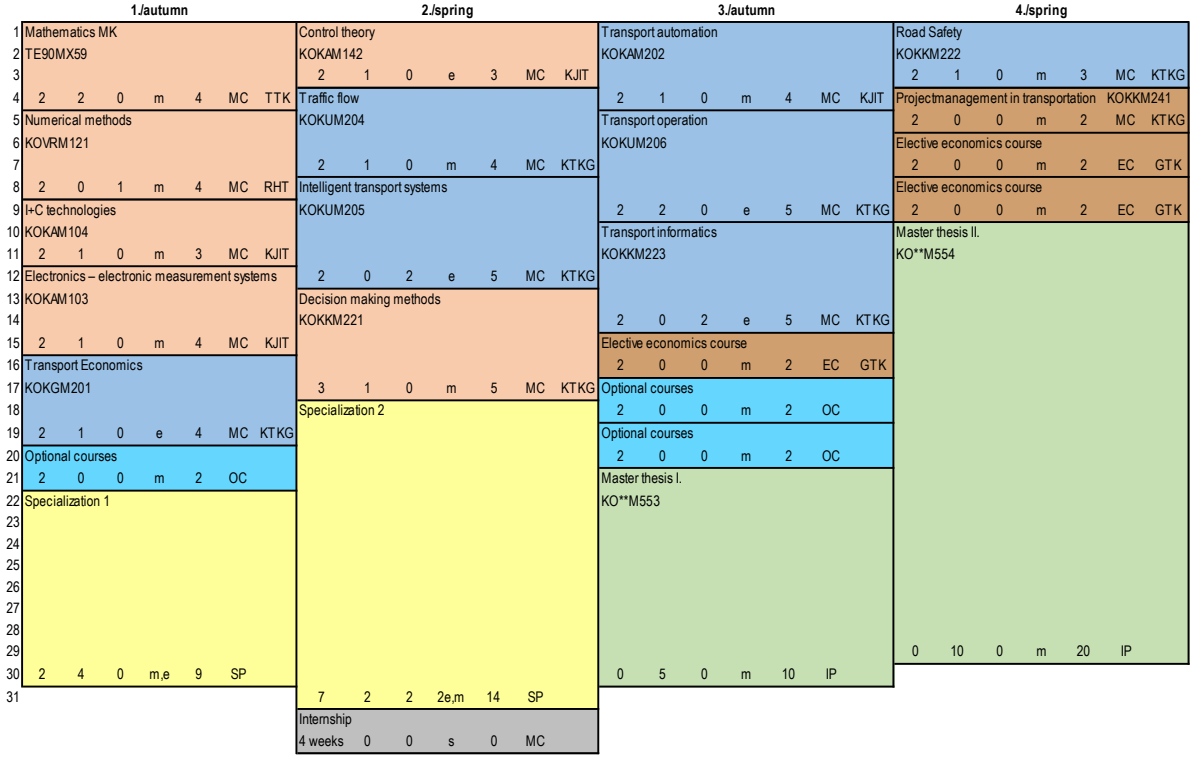
Valid from September 2018

Code:
6-MK_közös_2018_O
6-MK_közös_2018_T

Transportation Engineering Master Programme start in February



Transportation Engineering Master Programme start in September



Specializations

Air traffic management specialization

	Communications, Navigation and Surveillance (CNS) II KOKKM239 3 0 0 e 4 SP KTKG
	Air Traffic Control KOVRM235 2 0 1 e 4 SP RHT
Meteorology KOVRM231 2 0 0 e 3 SP RHT	
Communications, Navigation and Surveillance (CN KOKAM226 2 1 0 m 3 SP KJIT	Safety in air traffic control KOKAM243 2 0 0 m 3 SP KJIT
Air Traffic Management (ATM) KOVRM224 1 0 1 m 3 SP RHT	Case study KOVRM237 0 2 0 m 3 SP RHT

Forwarding specialization

	Trade, Financial, Accounting Techniques KOKKM138 1 1 1 e 3 SP KTKG
	Supply and distribution processes KOALM240 1 1 0 m 2 SP ALRT
Forwarding Management 1 KOKKM132 2 2 0 e 5 SP KTKG	Forwarding Management 2 KOKKM133 3 1 1 e 5 SP KTKG
Material handling and warehousing processes KOALM225 2 1 0 m 4 SP ALRT	Forwarding marketing KOKKM135 1 0 2 m 4 SP KTKG

Transportation automatization specialization

	Signal processing in transport KOKAM211 2 2 0 e 5 SP KJIT
Information connection of the vehicle and the track KOKAM232 2 0 0 m 3 SP KJIT	Project KOKAM242 0 2 0 m 3 SP KJIT
Modelling and control of vehicles and traffic system KOKAM233 2 3 0 e 6 SP KJIT	Engineering of transport automation systems KOKAM234 2 0 3 e 6 SP KJIT

Transportation engineer manager specialization

	Financing techniques in transportation KOKKM236 1 0 3 e 5 SP KTKG
Transport Infrastructure Management KOKKM228 2 0 0 m 3 SP KTKG	Management of transport and logistic services KOKGM217 2 2 0 e 6 SP KTKG
Strategic policy instruments in transportation KOKGM215 4 0 0 e 6 SP KTKG	Human resource management in transportation KOKKM238 1 0 2 m 3 SP KTKG

Transportation systems specialization

	City logistics KOALM244 2 2 0 e 5 SP ALRT
Smart City KOKKM227 2 0 0 m 3 SP KTKG	Passanger transportation KOKUM208 2 0 2 e 5 SP KTKG
Transport modelling KOKKM229 1 0 3 e 6 SP KTKG	Environmental effects of transport KOKKM230 2 1 0 m 4 SP KTKG

Course description explanation

1. Subject name	official name of the subject
2. Subject name in Hungarian	official name of the subject in Hungarian
3. Role	role of the subject in the curriculum, MC - mandatory; SP - specialization; EC - elective economics; OC - optional course
4. Code	Neptun code of the subject (with BME prefix)
5. Evaluation type	type of academic performance assessment, e - exam grade; m - mid-term grade
6. Credits	credit value of the subject
7. Weekly contact hours	number of weekly (term-based) teaching hours for students by lecture, practice and lab
8. Curriculum	master programs related to the subject,: A - Autonomous Vehicle Control Engineering J - Vehicle Engineering K - Transportation Engineering L - Logistics Engineering
9. Working hours for fulfilling the requirements of the subject	contact hours – personal appearance at classes in a university preparation for seminars – preparation at home for the classes homework – preparation of homework and other assignments for the classes reading written materials – reviewing and understanding the taken lessons at home midterm preparation – recommended preparation time at home for the midterm test during the semester exam preparation – recommended preparation time at home for the exam
10. Department	name of responsible department for managing the subject
11. Responsible lecturer	name of the person in charge of the subject (subject coordinator)
12. Lecturers	name of all lecturers of the subject
13. Prerequisites	predefined criteria for registering the subject
14. Desciption of lectures	detailed content of the lecture type course
15. Description of practices	detailed content of the practice type course
16. Description of laboratory practices	detailed content of the laboratory practice type course
17. Learning outcomes	results to achieve at the end of the learning process, grouped by competence
18. Requirements	requirements for passing the subject, aspects of performance evaluation, way to determine a grade (obtain a signature)
19. Retake and delayed completion	opportunity for repeat/retake and delayed completion
20. Learning materials	notes, textbooks, suggested literature, recommended learning support materials in printed or electronic form

Curriculum Supplement

All questions and conditions that regulate the study progress should be defined in this Supplement to the Curriculum. Thus, the Curriculum Supplement (curriculum appendix) contains **the system of subject prerequisites**, the rules for the selecting specializations, the description of the conditions for the **preparation of the Master thesis and the final examination**, as well as the order of the final exam.

1. The subject prerequisite system expresses the connections between the subjects. The specific subject prerequisites are included in the subject datasheets.

In the absence of a *strong* or a *weak* prerequisite, it is not possible to enroll in the subject, and no exceptions can be given, as it reflects the professional conditions of effective education. In the case of *co-requisite* subjects (simultaneous enrollment of two subjects in prerequisite connection), if the subject having a co-requisite subject is not fulfilled in the given semester, consequently the co-requisite subject also cannot be completed in that semester.

In the absence of the *recommended* prerequisite, the course can be enrolled, but it should be noted that the course is preferably assumes knowledge from the recommended prerequisite subject.

2. There are no general rules for the selection of specialization and for specialization subjects.

3. Enrollment rules for the Master thesis subjects in all specializations:

The **prerequisite for enrollment in the Master thesis I. course** are the completion of compulsory courses covering all the basic natural scientific knowledge in the recommended curriculum (i.e. mandatory courses marked with pink background) and the collection of a minimum of 56 credits.

The **prerequisite for enrollment in the Master thesis II. course** are the completion of compulsory courses covering all the basic natural scientific knowledge included in the recommended curriculum (i.e. mandatory courses marked with pink background) and the collection of a minimum of 84 credits. The Master thesis I. course can be enrolled simultaneously as co-requisite, in which case the above cumulative acquired credits must be achieved by completing another subjects according to the recommended curriculum. A further condition is the completion of the 4-week internship in case of full time master study.

4. Criteria for taking the final examination:

Completion of all subjects included in the recommended curriculum, including optional subjects (all together at least 120 credits), submitting the Master thesis and, in the case of a full-time master study, fulfillment of all criterion requirements in the curriculum (4 weeks of internship).

5. Final examination order:

The final examination in front of the Final Examination Board consists of **defending the Master thesis** and **passing oral final exams from three subjects** (or subject groups). The final exam subjects (or subject groups) are assigned by the Department responsible for the specialization. The subjects must be selected partly from the professional core subjects, and from the specialization subjects, so that each subject has a minimum credit value of 3 and the knowledge of the three subjects (or subject groups) is **at least 15 credits in total.**

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Air Traffic Control**				
2. Subject name in Hungarian	Air Traffic Control			**3. Role**	
4. Code	**KOVRM235**	**5. Evaluation type**	**e**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**0 practice**	**1 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	11 hours	**Homework**	0 hours
Reading written materials	53 hours	**Midterm preparation**	4 hours	**Exam preparation**	10 hours

10. Department	Department of Aeronautics and Naval Architecture
11. Responsible lecturer	Dr. Rohács Dániel
12. Lecturers	Dr. Rohács Dániel, Gál István

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

ELEMENTS OF AIR TRAFFIC CONTROL - History of ATC. Elements of ATC. Aerodrome Control (TWR). Approach Control (APP). Area Control (ACC).

AIRSPACE CLASSES AND CATEGORIES - Definition of airspace. Classes of airspace. Elements of airspace. Hungarian airspace. Sectorization. Special airspace types.

MODERN ATC METHODS - Limitations of previous methods. National and European characteristic. Functional Airspace Block project. Flexible Use of Airspace. Free Route Airspace. HUFRA (Hungarian Free Route Airspace)

SUPPORT SYSTEMS - Tasks and work structure of Air Traffic Control Officers. Separation. Dangerous situations. Short- and Mid Term Conflict Alert (STCA & MTCA). Proximity Warning methods (MSAW & APW).

HUMAN FACTORS OF ATC - Minimum skills and basic knowledge. Methods of assessing abilities, FEAST test. Psychological factors. Health factors. Human factors. Case studies.

15. Description of practices

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16. Description of laboratory practices

During labor courses students become familiar with ATC procedures and methods and effects of measuring human factors.

17. Learning outcomes

a) knowledge:

- Knows and understands the work of ATC. Knows the elements of airspaces, the elements, methods and support systems of the Air Traffic Control. Knows the requirements of ATCOs, the concept of workload and human factors, their measurement capabilities.

b) skills:

- Based on the knowledge above the student can master the deeper, more specific knowledge of ATC activities, elements and subprocesses quickly and easily.

c) attitude:

- Interested, responsive.

d) autonomy and responsibility:

- is able to independently further propagate in various special fields of the learned field.

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

Mid-term requirement: Performing laboratory excercises and 1 mid term exam

Final grade: 1 exam measuring the theoretical knowledge. The final grade is the result of the exam

19. Opportunity for repeat/retake and delayed completion

Retake possibility of a laboratory excercise or the mid-term exam
Retake exam possible according to the general rules of BME

20. Learning materials

The presentation about the lectures
Literature

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Air Traffic Management (ATM)**				
2. Subject name in Hungarian	Air Traffic Management (ATM)			**3. Role**	
4. Code	**KOVRM224**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**1 lecture**	**0 practice**	**1 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	9 hours	**Homework**	0 hours
Reading written materials	47 hours	**Midterm preparation**	6 hours	**Exam preparation**	0 hours

10. Department	Department of Aeronautics and Naval Architecture
11. Responsible lecturer	Dr. Rohács Dániel
12. Lecturers	Dr. Rohács Dániel, Gál István

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

DEFINITION OF ATM - History and evolution of Air Traffic Management. The need for Air Traffic Management. ATM in the complete Air Traffic System.

BASIC ELEMENTS - The structure of air traffic. International rules and laws. Air Traffic Flow Management. Air Traffic Control. Air Space Management

THE LIMITATIONS OF CURRENT SYSTEM - The history of air traffic growing. Industry crises and their effects. Important traffic hubs and routes. Structure and evolution of air traffic.

FUTURE OBJECTIVES AND DOCUMENTS - Traffic analysis and forecasting. Single European Sky. SESAR projects. Clean Sky projects. FligthPath 2050.

ADVANCED AND FUTURE SYSTEMS - Separating and collision avoidance systems. Augmented Reality systems. Development of Remote Tower projects. Slot and take-off management. Workload and stress measurement methods.

15. Description of practices

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16. Description of laboratory practices

During labor courses students become familiar with the basic processes and future developments, especially with rTower and stress monitoring methods.

17. Learning outcomes

a) knowledge: Knows and understands the basic methods and necessities of Air Traffic Management. Knows the system of ATM and its subprocesses, related methods and technologies, and their capabilities. Get familiar with the current important research areas and objectives, and with actual projects.

b) skills: Based on the knowledge above the student can master the deeper, more specific knowledge of ATM activities and subprocesses quickly and easily.

c) attitude: Interested, responsive.

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

Performing laboratory practice and 1 mid-term exam (measuring the theoretical knowledge). The final grade is the result of the mid-term exam.

19. Opportunity for repeat/retake and delayed completion

Retake possibility of a laboratory excercise or the mid-term exam

20. Learning materials

The presentation about the lectures
Literature

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Case study**				
2. Subject name in Hungarian	Case study			**3. Role**	
4. Code	**KOVRM237**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**0 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	8 hours	**Homework**	50 hours
Reading written materials	4 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

10. Department	Department of Aeronautics and Naval Architecture
11. Responsible lecturer	Dr. Rohács Dániel
12. Lecturers	Gál István

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

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15. Description of practices

During the course, students must participate in an R&D project from the Faculty's ATC projects. Analyzing the tasks to be solved for the project objective.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: Knows and understands the basic theoretical and practical methods of the chosen area.

b) skills: Able to summarize and present the result achieved in the project, able to use the tools of informatics. Able to utilizing the knowledge acquired in the chosen area.

c) attitude: Interested, responsive, independent, take care for the deadlines.

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

Preparation of 1 documentation about the project

19. Opportunity for repeat/retake and delayed completion

Delayed submission of the documentation

20. Learning materials

Special literature for project work

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**City logistics**				
2. Subject name in Hungarian	Városi logisztika			**3. Role**	
4. Code	**KOALM244**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	12 hours	**Homework**	30 hours
Reading written materials	32 hours	**Midterm preparation**	0 hours	**Exam preparation**	20 hours

10. Department	Department of Material Handling and Logistics Systems
11. Responsible lecturer	Dr. Sárdi Dávid
12. Lecturers	Dr. Sárdi Dávid, Bakos András

13. Prerequisites	Smart City (KOKKM227), strong; - (-), -; - (-), -

14. Description of lectures

The main types of transported goods in the city supply networks, the typical solutions of the bulding of the unit loads considering the requiurements of the city supply systems. The definition of last mile problem. The rule of city logistics in the global logistics networks, the main types of the city supply chains. The role and the application of the traditional and the multi-modal transporting systems in the city supply chains. The typical solutions of the loading technologies, the loading machines and facilities in the city logistics. The rule and the development of logistics providers in the city supply chains, the typical logistics services in the city supply chains, the classification system of the logistics centres, the main levels of the city logistics networks. The technological solutions of the several logistics centres. The definition of the gateway conceptions, the determination and the function of the main network nodes. The integration of the city logistics functions in the gateway conception. The urban consolitation centres and the x-docks. The control and organization of city logistics in big cities. The technological and organization solutions of the city logistics, best practices worldwide. Application of modelling techniques in the organization and operation of the city logistics systems. Informatics in city logistics.

15. Description of practices

Practical presentation of modeling and methodological solutions described in the lectures through examples. Description of the practical task of planning a city network, preparing the homework.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:

- Knowledge of the basics of building logistics networks.
- Knowledge of logistics services and service centers.
- Knowledge of city logistics methods.

b) skills:

- Can design urban logistics networks.

c) attitude:

- Strive to maximize their abilities to make their studies at the highest possible level, with a profound and independent knowledge, accurate and error-free, in compliance with the rules of the applicable tools, in collaboration with the instructors.

d) autonomy and responsibility:

- Take responsibility for the quality of the work and the ethical standards that set an example for the classmates, using the knowledge acquired during the course.

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

The requirement of the signature is to fulfill two homeworks, to participate at city logistics fieldwork and writing a report about it. The homeworks (20%-20%), the report about the fieldwork (10%) and the exam result (50%) are included in the final grade.

19. Opportunity for repeat/retake and delayed completion

The two homeworks and the report about the fieldwork can be resubmitted once.

20. Learning materials

Students can download the subject notes in pdf format via Moodle.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Communications, Navigation and Surveillance (CNS) I.**				
2. Subject name in Hungarian	Communications, Navigation and Surveillance (CNS) I.			**3. Role**	
4. Code	**KOKAM226**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	8 hours
Reading written materials	20 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Meyer Dóra
12. Lecturers	Dr. Meyer Dóra

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The basics of navigation. Coordinate systems, map types, calculation of navigation elements (eg direction, wind triangle, fuel consumption, flight time, flight speed), route planning. Theoretical background, structure, data traffic, operation and exercises of navigation systems.

Ground systems: non-directional beacons (NDBs) / Automatic direction finder (ADF)

GLOBAL NAVIGATION NAVIGATION SYSTEMS (GNSS)

PRIMER RADAR AIRCRAFT CONTROL. Using Primary Radars. Characteristics of primary radars. Grouping radars according to their field of application. Antennas (PSR). Transmitter equipment. Receiver equipment. Plot extractor and signal processing. Plot combination. Transmission of data. ROAD RADAR (SMR). Aerodrome use of roller radars. SMR radar sensor. SMR display systems. SECONDARY RADAR SSR and MSSR. Use secondary radars. Antenna. SSR Interogator, Transponder. Customer. Plot extractor and signal processing. Combining Plot. THE S MODE. ADS. ADS-B techniques. S mode extended squitter. ADS-C techniques. MULTILATERATION (MLAT)

15. Description of practices

Design tasks, maintenance tests, operational tests

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- is familiar with the basic concepts of air navigation
- knows ground navigation systems
- knows different satellite navigation systems

b) skills:
- is able to interpret data from aviation information systems
- be able to participate in the specification and design of air traffic information systems.

c) attitude:
- is interested in modern IT solutions

d) autonomy and responsibility:
- is able to independently further propagate in various special fields of the learned field.

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

Two midterm exams, both must be sufficient, plus performing the individual task, final semester mark is the rounded up average of the midterm exams.

19. Opportunity for repeat/retake and delayed completion

The midterm exams can be retried at the end of the semester. The individual task cannot be delayed completed.

20. Learning materials

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Communications, Navigation and Surveillance (CNS) II.**				
2. Subject name in Hungarian	Communications, Navigation and Surveillance (CNS) II.			**3. Role**	
4. Code	**KOKKM239**	**5. Evaluation type**	**e**	**6. Credits**	**4**
7. Weekly contact hours	**3 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	6 hours	**Homework**	0 hours
Reading written materials	51 hours	**Midterm preparation**	6 hours	**Exam preparation**	15 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Somogyi Rita
12. Lecturers	Dr. Somogyi Rita

13. Prerequisites	Communications, Navigation and Surveillance (CNS) I. (KOKAM226), strong;

14. Description of lectures

Communication (COM)
Introduction to voice communication
Air to ground communication (communication elements on the CWP, objectives and operation of these elements, future trends, CPDLC)
Ground to ground communication (communication elements on the CWP, tasks of the communication centre, MFC, ATS Qsig, VoIP, future trends)
Data communications (basics of the data communication, aviation specific networks and protocols, OLDI-FMTP, AFTN-AMHS, PENS)
Data processing
Introduction of the data processing
General functions of the FDP and SDP
Basics of SDP (plot processing, track processing (single/multi track))
Basics of FDP (FPL data processing, coupling)
FDP (IFPS, route processing, code/callsign correlation, code assignement, track labelling)
HMI
Surveillance (SUR)
Theory and practice of multilateration (LAM, WAM).

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: - Knows and can enumerate the CNS COM systems - Knows the basic operational principles of the CNS COM systems - Knows the practical areas of usage of CNS COM systems b) skills: - capable to distinguish between air to ground és a ground to ground systems. - is able to carry out market analysis as based on his/her knowledge.
c) attitude: - Able to work independently and autonomously.
d) autonomy and responsibility: - The student becomes sufficiently aware of flight safety and security. - Is able to determine his/her borders of responsibility, can determine what he/she may take responsibility for.

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

The signature can be successfully achieved by completing one written test at at least 50%. The final grade equals to the result of oral exam.

19. Opportunity for repeat/retake and delayed completion

The written test, if unsuccessful, can be rewritten once.

20. Learning materials

Slides from the presentations.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Control theory**				
2. Subject name in Hungarian	Irányításelmélet			**3. Role**	k
4. Code	**KOKAM142**	**5. Evaluation type**	**e**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**JK**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	13 hours	**Midterm preparation**	12 hours	**Exam preparation**	15 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Gáspár Péter
12. Lecturers	Dr. Gáspár Péter

13. Prerequisites	- (-), -

14. Description of lectures

Introduction. Recap on the basic concepts of control theory and stability theory (stability conditions, stability of closed loop systems). State space theory (state space representations and properties, transformations). Continuous state space of linear time-variant dynamic systems. Control in state space. State feedback design. Optimal controls. Linear Quadratic Controller Design (LQR). Computer controlled systems. Designing discrete controls. Observability, controllability properties. Stability. State estimation. Kalman filtering. Problems from different means of transport :road, air, logistics. Presentation of design tasks through vehicle, transport and logistic examples. Computer-oriented control theory tasks. Outlook (introductory, problematic). Postmodern techniques. Predictive controls. Error detection and importance in transport. MIMO systems. Nonlinear systems.

15. Description of practices

Implementation of the methods learned during the lectures

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: - knows the basic dynamic system modeling paradigms, their mathematical background, - knows the time and frequency range description of linear time-variant systems, - knows the principles of regulation, their quantitative and qualitative criteria, - is familiar with various simple feedback control methods, - knows the basics of modern control theory, the principles of quadratic regulation, - knows the methods of filter design,

b) skills: - capable of modeling of a specified system, - is able to independently design a specific system model, - is able to apply the estimation design methods independently, - is able to handle the most common control design softwares

c) attitude: - is interested in a mathematical solution to control problems, - endeavor to effectively apply the word technology knowledge through practical problems, - acquires system-level thinking

d) autonomy and responsibility: - can independently provide quality and quantity parameters for a system's performance, enabling them to make decisions about system redesign, - can independently describe a particular system, use the appropriate mathematical formalisms, - is able to make decisions on the appropriate methods of solving the control task

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

Two midsemester exams, min. 70% presence on lectures and seminars, which are the prerequisite of the final exam. The final grade depends only on the final exam.

19. Opportunity for repeat/retake and delayed completion

Both midsemester exams can be retried once.

20. Learning materials

Lecture Notes, Kailath: Linear Systems, Prentice Hall

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Decision making methods**				
2. Subject name in Hungarian	Döntéselőkészítő matematikai módszerek			**3. Role**	
4. Code	**KOKKM221**	**5. Evaluation type**	**m**	**6. Credits**	**5**
7. Weekly contact hours	**3 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	10 hours	**Homework**	16 hours
Reading written materials	56 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Sipos Tibor
12. Lecturers	Dr. Sipos Tibor, Dr. Szabó Zsombor

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Principles of mathematical modeling. Solving linear programming problems using the simplex methods. Application of primal-dual methods in the decision process. Programming methods applied frequently in the transportation: transportation, assignment models, integer programming methods. Network problems and methods: maximum flow, minimum-cost flow problem, shortest path problem, critical path method. Dynamic programming. Principles of nonlinear programming, game theory, stochastic processes. Queuing models and their application in the transportation. Stocking problems. Markov chains and their application in transportation. Forecasting. Simulation. MultiCriteria Analysis.

15. Description of practices

Solving linear programming and other problems using computers, developing and solving simplified real life case studies.

16. Description of laboratory practices

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17. Learning outcomes

The student gets acquainted with the principal mathematical modeling methods, and will be able to identify and solve the decision problems, applying integrated technical and economical knowledge.

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

The semester mark is resulted by the 2 midterm tests passed by the students during the semester.

19. Opportunity for repeat/retake and delayed completion

The midterms can be retaken according to the Code of Studies.

20. Learning materials

Hillier, F.S. – G.J. Lieberman: Introduction to Operation Theory

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Electronics – electronic measurement systems**				
2. Subject name in Hungarian	Elektronika - elektronikus mérőrendszerek			**3. Role**	k
4. Code	**KOKAM103**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**JK**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	52 hours	**Midterm preparation**	18 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Szabó Géza
12. Lecturers	Dr. Szabó Géza, Dr. Hrivnák István, Dr. Borbás Lajos

13. Prerequisites	- (-), -

14. Description of lectures

It provides engineering knowledge (and develops BSc knowledge further) about the basic theory of electronics and electronic measurement systems, about modeling them, and about their use in transport systems. Introduces students to the operating principles of the basic elements of electronics and measurement technology, the modeling and analysis methodology of circuitry with active circuit elements. It reviews the methods of measuring various electrical and mechanical quantities and the possibilities of processing the measurement results. It illustrates the possibilities of use through various examples of transport sectors. Topics: Basics of network analysis, Four Pole Theory; analysis rules for circuit elements and networks. Use of active electronic devices in switching mode, analyzing switched operation. Use of active electronic devices in linear operation; small signal AC models of components and networks and analyzing such networks. The use of operational amplifiers (OpAmps). Frequency dependency, frequency dependent amplifiers. Basics of measurement technology, measurement theory. Measurement of signals and signal parameters. Measurement characteristics of signaling and signal transformation. Measurement characterization of signal sources. Signal analysis tools. Review of measurement errors in measurement systems, failure analysis and measurement accuracy issues. Transmitters and transducers of the measuring system. Measuring circuits. Features and tools for signal processing and data storage. Measurement of basic electrical parameters. Voltage measurement, current measurement. Frequency and time measurement. Measuring instruments and measuring tools, calibration. Time and frequency domain. Measurements in the frequency domain. Possibilities of electronic measurement of mechanical quantities. Application of computerized measurement environments for measurement, data collection tasks; signal processing methods. Practical demonstration and active measurement with a special mechanical tension and strain gauge. Failure analysis of equipment and subsystems containing rotating elements using noise and vibration tests.

15. Description of practices

Application of the principles presented on the lectures

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: understand and can apply the circuit analysis techniques of electronic circuits; has knowledge of measurement and measurement theory related to transport and vehicle engineering.

b) skills: able to analyze or specify electronic sub-systems (eg. motor control or safety traffic control devices) in the field of transport and vehicle.

c) attitude: to participate in solving electric problems in the field of transport or vehicle, to work efficiently and willingly with specialists of other fields (in particular: electrical engineering)

d) autonomy and responsibility: he/she is aware of and treats the responsibility associated with the task solution during electronic system analysis and specification.

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

Two midterm tests. The final result based on the average of the tests.

19. Opportunity for repeat/retake and delayed completion

One test can be retried at the end of the semester

20. Learning materials

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Engineering of transport automation systems**				
2. Subject name in Hungarian	Közlekedésautomatikai rendszerek tervezése			**3. Role**	
4. Code	**KOKAM234**	**5. Evaluation type**	**e**	**6. Credits**	**6**
7. Weekly contact hours	**2 lecture**	**0 practice**	**3 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for seminars**	25 hours	**Homework**	34 hours
Reading written materials	41 hours	**Midterm preparation**	0 hours	**Exam preparation**	10 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Bartha Tamás
12. Lecturers	Dr. Bartha Tamás, Dr. Tettamanti Tamás, Lövétei István, Dr. Varga István

13. Prerequisites	- (-), -

14. Description of lectures

Air transport:
Airline side operation of civil air traffic management, softwares, practice.
Daily maintenance and operation theory of civil aircrafts.
Complex process design knowledge in civil aviation control.
Softwares of the air traffic control, its input and output data, HMI.
Automation systems at the airport.
The ground handling processes.
Planning of the airside operation.
Road transport:
Modelling and controlling the road traffic by MATLAB-SIMULINK.
Microscopic modelling of the road traffic by VISSIM simulator, realization of high level modelling techniques by programming VISSIM-COM-MATLAB.
Application of the QGIS software to perform basic geoinformatics tasks.
Macroscopic modelling of the road traffic by VISUM simulator.
Rail transport:
Design steps in the field of interlocking and connected systems. Levels, structures, forms and notation of plans (Tender Plan, Authorozation Plan, Preliminary Plan, Construction Plan, Documents for the Operators, User Guides).
Safety processes and approval procedures during the development and the implementation of interlocking and train controlling systems.

15. Description of practices

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16. Description of laboratory practices

Individual design plan.

17. Learning outcomes

a) knowledge:
b) skills: - capable of breaking down a project task into elements based on specification, - is able to design a development process, - is able to track and document a development process c) attitude: - is open to independently carry out development tasks
d) autonomy and responsibility: - is able to make responsible decisions in a development project

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

For signature: submission of the completed and documented work. During the verbal exam the work will be presented by the student. The presentation determines the final grade.

19. Opportunity for repeat/retake and delayed completion

The individual task cannot be delayed completed.

20. Learning materials

Slides

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Environmental effects of transport**				
2. Subject name in Hungarian	Közlekedés környezeti hatásai			**3. Role**	
4. Code	**KOKKM230**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	19 hours
Reading written materials	45 hours	**Midterm preparation**	6 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Török Ádám
12. Lecturers	Dr. Török Ádám

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Transport- environment, factors of environmental impact, the problem of sustainability. Mitigation of environmental impacts of transport, regulations, policies, tendencies, practices. Local and international case studies. EIA, decision making, preparation of decisions on the field of transport infrastructure development. Integration of transport and land use policies. Environmental conflicts of freight transport, intermodality and transit policies. Environmental costs of transport, the case of externalities, prices and charges. Urban transport, opportunities of sustainable urban environmental management, integration of environmentally sound mobility forms. Sustainable Urban Mobility Plans. Demand management, parking and road charges. Requirements of fuel efficiency, alternative fuels, energy efficient and environmentally enhanced vehicles.

15. Description of practices

Internal and external discussions, consulations with experts and representatives of firms, instiurions dealing with transport environmental impact, referring to certain elements of the curricula.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:

- Environmental impact factors of transport, manifestations, physical, and health effects.
- Components of sustainability, the transportation oriented elements of the three main fields, criteria.
- Regulation elements of the impact mitigation, main fields, methods, management and approach methods on the field of transport.
- Elements of impact assessment process, in the case of transport infrastructure development, national and international regulation.
- Planning integration in the joint approach of transport, environment and land use planning.
- Opportunities of moderation, and management of environmental impacts of freight transport, methods and technics in the three main directions and those application.
- Internalisation of external costs of transport, methods, regulation opportunities, techniques, methodologies.
- Relationship of sustainable urban environmental management and transport, methods of reduction of urban environmental impacts, techniques.
- Soft mobility forms in the mobility structure, supporting environment, infrastructure, regulation opportunities.
- Physical and technical knowledges on the field of transport noise, methods of noise protection, regulation opportunities, techniques of prevention.
- Sustainable driving modes, components of fuel structures, technical and regulatory questions.

b) skills:

- Shift of planning and development of transport systems towards environmentally sound directions, in the frame of the future individual and team work.
- Ability of preference of environmental principles during management of existing transport systems and infrastructures, in favor of sustainability and safeguarding of natural, built and social environment.
- Application, reception and development of regulation and planning methods, for the management and reduction of environmental impacts of elements of transport verticum.

c) attitude:

- Openness and sensitivity to tasks and conflict management of environmental impacts of transport, and to reception, application and development of innovative solutions.
- Basic approach at development of transport infrastructures and at management of existing systems, the reduction of those environmental impacts, management of environmental costs and external impacts.

- Representation and enforcement of prevention principle, on the field of daily decisions and communication, regarding transport impacts.

d) autonomy and responsibility:

- Self-motivated, responsible and exemplary behaviour, in the creative engineering work, in research and development processes, and renewal of existing systems, regarding application and dissemination of sustainability principles on transport.
- Independent and self-motivated behaviour on the fields of transport innovation, focusing on principles and values of sustainability, natural resource protection and safeguarding the society.
- Adequate responsibility in the decision making process, the preparation and making of decisions with particular attention to the long term consequences of decisions and awareness raising.

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

Midterm written test is passed and the fulfilled and presented assignment. The semester mark is the average of midterm written test and assignment results.

19. Opportunity for repeat/retake and delayed completion

Supplementary submission and presentation of semester papers, assignments and fulfilment of failed or not acceptable written tests, during the supplementary week

20. Learning materials

Lecture notes, presentation and further professional materials in electronic form

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Financing techniques in transportation**				
2. Subject name in Hungarian	Finanszírozási technikák a közlekedésben			**3. Role**	
4. Code	**KOKKM236**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**1 lecture**	**0 practice**	**3 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	14 hours	**Homework**	18 hours
Reading written materials	40 hours	**Midterm preparation**	12 hours	**Exam preparation**	10 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Nagy Zoltán
12. Lecturers	Nagy Zoltán

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Concepts of financing: financing goals (development, operation); financing options: budget, private or public-private partnerships (PPP); loan, bond, lease and their characteristics. Significance of the PPP trabsport projects. Project analysis and evaluation methods. Project identification, technical preparation, traffic forecast and modeling. Risk assessment needs. Feasibility studies, cost-benefit analysis, financial, social, legal, regulatory and technical compliance criterias. The identification of project risks. Definition of government, regional and local priorities. The role of the partners in the project financing. Communication tasks. The media's role for accepting the project financing methods by the society. Optimizing fees and tariffs. Financial structures and models. Contracts.

15. Description of practices

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16. Description of laboratory practices

Computer labs for making modell calculations to illustrate and practice the details of project finance, and for analyzing case studies.

17. Learning outcomes

a) knowledge: the student becomes familiar with the significant financial and economical aspects of the development projects in transportation and logistics

b) skills: the student can evaluate and increase the financial-economical efficiency of projects

c) attitude: the student strives for the integrated handling of the technical, economical, social, financial and environmental aspects of transportation projects.

d) autonomy and responsibility: the student is able to make independent analyzis and evaluation activities.

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

Requirements for signature: writing a midterm test, and preparing and presenting a paper for a transportation project. There is a written exam at the end of the semester. Weights of requirements in final mark: homework document and presentation (50%), written examination (50%).

19. Opportunity for repeat/retake and delayed completion

It's possible to retake the midterm test, the written homework and presentation can be delayed till end of delayed completion period.

20. Learning materials

Presentation slides and electronic course material.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Forwarding Management 1**				
2. Subject name in Hungarian	Szállítmányozási menedzsment 1			**3. Role**	
4. Code	**KOKKM132**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**KL**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	8 hours	**Homework**	30 hours
Reading written materials	24 hours	**Midterm preparation**	12 hours	**Exam preparation**	20 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc, Dr. Duleba Szabolcs

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

General knowledge of freight forwarding: evolution, position and market of freight forwarding. Fundamentals. Contract of carriage and forwarding. Special tasks of dangerous goods, perishable goods, live animals, plant products. Forwarding of overweighted and oversized items, weekend traffic restrictions. Customs and customs procedures, application rules. Product protection. Pricing methods in contracting. Forwarding parities. Insurances used in freight forwarding.

15. Description of practices

Students prepare and submit case study reports on current freight forwarding topics.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: the student is familiar with the basic legal system of freight forwarding.

b) skills: The student is able to recognize and apply the legal rules for freight forwarding tasks.

c) attitude: the student strives for completeness in the acquisition of knowledge, co-operates with the teacher and other students, is open towards new and innovative ideas, researches, and uses information technology and computing tools for its work.

d) autonomy and responsibility: the student is sensitive towards the environmental and social aspects of freight forwarding, asks for professional opinions of others, makes responsible decisions in organising the freight forwarding tasks, manages the challenges responsibly.

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

Requirements for signature: fulfilment of the two midterms, report and submission (in approx. 10 pages) of a special topic within freight forwarding. There is a verbal examination at the end of the semester. Weights of requirements in final mark: reporting activity (20%), average of midterms (30%), verbal examination (50%).

19. Opportunity for repeat/retake and delayed completion

There are retakes from 1st and 2nd midterms, the written report can be delayed completed and presented till end of delayed completion period.

20. Learning materials

Bokor, Zoltán (2013) Freight forwarding (in Hungarian). Course book, BME Dept. of Transport Technology and Economics

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Forwarding Management 2**				
2. Subject name in Hungarian	Szállítmányozási menedzsment 2			**3. Role**	
4. Code	**KOKKM133**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**3 lecture**	**1 practice**	**1 lab**	**8. Curriculum**	**KL**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	70 hours	**Preparation for seminars**	12 hours	**Homework**	30 hours
Reading written materials	6 hours	**Midterm preparation**	12 hours	**Exam preparation**	20 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc, Dr. Duleba Szabolcs

13. Prerequisites	Forwarding Management 1 (KOKKM132), strong; - (-), -; - (-), -

14. Description of lectures

Mode-specific knowledge of freight forwarding. International and domestic conventions / rules, technology and pricing of freight haulage and forwarding on road. International and domestic conventions / rules, technology and pricing of freight haulage and forwarding on rail. International and domestic conventions / rules, technology and tariffs of freight haulage and forwarding for inland waterway transports. International and domestic conventions / rules, technology and pricing of freight haulage and forwarding of maritime transport and shipping. International and domestic conventions / rules, technology and pricing of freight haulage and forwarding for air transports. International and domestic conventions / rules, technology and pricing for combined freight transports. International and domestic conventions / rules, technology, and pricing for groupage freight transports.

15. Description of practices

Students prepare and submit case study reports on current freight forwarding topics.

16. Description of laboratory practices

Calculation tasks for the individual case studies.

17. Learning outcomes

a) knowledge: the student is familiar with the mode-specific legal system of freight forwarding.

b) skills: The student is able to recognize and apply the mode-specific legal rules for freight forwarding tasks.

c) attitude: the student strives for completeness in the acquisition of knowledge, co-operates with the teacher and other students, is open towards new and innovative ideas, researches, and uses information technology and computing tools for its work.

d) autonomy and responsibility: the student is sensitive towards the environmental and social aspects of freight forwarding, asks for professional opinions of others, makes responsible decisions in organising the freight forwarding tasks, manages the challenges responsibly.

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

Requirements for signature: fulfilment of the two midterms, report and submission (in approx. 10 pages) of a special topic within freight forwarding. There is a verbal examination at the end of the semester. Weights of requirements in final mark: reporting activity (20%), average of midterms (30%), verbal examination (50%).

19. Opportunity for repeat/retake and delayed completion

There are retakes from 1st and 2nd midterms, the written report can be delayed completed and presented till end of delayed completion period.

20. Learning materials

Bokor, Zoltán (2013) Freight forwarding (in Hungarian). Course book, BME Dept. of Transport Technology and Economics

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Forwarding marketing**				
2. Subject name in Hungarian	Szállítmányozási marketing			**3. Role**	
4. Code	**KOKKM135**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**1 lecture**	**0 practice**	**2 lab**	**8. Curriculum**	**KL**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	16 hours	**Homework**	20 hours
Reading written materials	36 hours	**Midterm preparation**	6 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Kővári Botond
12. Lecturers	Dr. Kővári Botond

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Marketing definition, specialized areas in transportation. Relation between product-market, price-quality. Sales function and benefit of the company in the view of marketing. Market research methods, consumer market types. Competition and target market analysis. Product life cycle. Analyzing the resources. Service marketing.

15. Description of practices

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16. Description of laboratory practices

Market and product analysis. Case studies about market position. Calculations about product mix analysis of a company.

17. Learning outcomes

a) knowledge: Familiar with marketing strategy of a company, business plan. b) skills: Ability to analyse a market, make a product mix analysis. c) attitude: Strive to acquire the highest level of system approach. d) autonomy and responsibility: Responsible applies of acquired knowledge in individual or in team work.

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

Requirements for the midterm mark: fulfilment of one midterm test, report and submission (in approx. 10 pages) of a special topic within business planning. Weights of requirements in final mark: midterm test (60%), report and submission (40%).

19. Opportunity for repeat/retake and delayed completion

Second test possibility for those not present on the test, possibility of delayed deadline for homework.

20. Learning materials

Suggested books and papers.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Human resource management in transportation**				
2. Subject name in Hungarian	Közlekedési humán erőforrás menedzsment			**3. Role**	
4. Code	**KOKKM238**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**1 lecture**	**0 practice**	**2 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	16 hours	**Homework**	13 hours
Reading written materials	13 hours	**Midterm preparation**	6 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Kővári Botond
12. Lecturers	Dr. Kővári Botond

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

General knowledge about human resource: carrier, ability development, time management, recruitment, presentation, negotiation techniques. Special human management knowledge in transport companies: culture, trainings, stress, teamwork, leadership evaluation.

15. Description of practices

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16. Description of laboratory practices

On labor meetings, students make a homework presentation and discuss each others papers.

17. Learning outcomes

a) knowledge: Familiar with human management strategy and tasks of a company. b) skills: Ability to handle the employees in a correct way, knows how to motivate them. c) attitude: Strive to acquire the highest level of system approach. d) autonomy and responsibility: Responsible applies of acquired knowledge in individual or in team work.

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

Requirements for the midterm mark: fulfilment of one midterm test, report and submission (in approx. 10 pages) of a special topic within human management. Weights of requirements in final mark: midterm test (60%), report and submission (40%).

19. Opportunity for repeat/retake and delayed completion

Replacement test possibility for those not present on the test, possibility of delayed deadline for homework.

20. Learning materials

Suggested books and papers.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**I+C technologies**				
2. Subject name in Hungarian	I+K technológiák			**3. Role**	
4. Code	**KOKAM104**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	22 hours	**Midterm preparation**	18 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Bécsi Tamás
12. Lecturers	Dr. Aradi Szilárd, Lövétei István

13. Prerequisites	- (-), -

14. Description of lectures

Numeral systems and coding. Overview of numeral systems involved in computing, conversion procedures between numeral systems. Number coding procedures: pure binary code, complement code, BCD code. Character encoding methods: ASCII coding, character encoding.

Arithmetic. Operations with binary numbers: binary addition, complement code addition, BCD addition, subtraction algorithms, multiplication algorithms, division algorithms.

Components for computers. Logical gates, repositories, multiplexers and demultiplexers, registers, counters and their use.

Computer Structure. Processors: The task, structure and operation of the processors. Historical development of processors. Memory: the task, types, structure and operation of the memories. Bus systems: the task, structure and operation of bus systems; different types of bus systems used in computers; industrial bus systems and their characteristics.

Computer peripherals. Mass storage: magnetic mass storage devices (flexible and hard disks, magnetic tape storage), optical storage procedures, electronic storage devices. Publishers: CRT and LCD displays. Input devices: mouse, keyboard and special input devices.

Computer communication. Physical and logical implementation of communication: serial and parallel data transmission, synchronous and asynchronous data transmission. Standard communication protocols. Computer Networks: General and Industrial Network Structures and Protocols, Network Devices. Wireless communication technologies: bluetooth, IR, WiFi etc. Special transport communication technologies

15. Description of practices

Implementation of the methods learned during the lectures

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- knows the basics of building computer systems
- knows the basic mathematical / arithmetic background of computing
- knows the operating principles of different peripherals.
- knows basic communication technologies

b) skills:
- capable of programming embedded systems
- is able to design data collection systems

c) attitude:
- is interested in modern IT solutions

d) autonomy and responsibility:
- is able to apply the knowledge acquired here to other systems unknown to it.

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

Two midterm exams

19. Opportunity for repeat/retake and delayed completion

One exam can be retried at the end of the semester

20. Learning materials

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Information connection of the vehicle and the track**				
2. Subject name in Hungarian	Jármű-pálya információs kapcsolata			**3. Role**	
4. Code	**KOKAM232**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	24 hours
Reading written materials	22 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Szabó Géza
12. Lecturers	Dr. Szabó Géza

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The course provides an overview of the procedures and methods of information transfer between the vehicle and the track in different transport sectors. In addition, it presents technologies and traffic management methods developed based on information transfer. The course focuses on the needs assessment, specification and selection of appropriate technology for communications in transport systems.

Topics: Specifics of communications; general communication techniques. Wired and broadcast transmissions; characteristics of broadcast transmissions. Steps to specify communication needs; the conditions for fulfilling the specification; choice of available technologies for communication.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: understand and can apply communication techniques; has knowledge of communication theory related to transport and vehicle engineering.

b) skills: able to analyze or specify communication sub-systems in the field of transport and vehicle.

c) attitude: to participate in solving communication problems in the field of transport or vehicle, to work efficiently and willingly with specialists of other fields (in particular: electrical engineering)

d) autonomy and responsibility: he/she is aware of and treats the responsibility associated with the task solution during transport system communication analysis and specification.

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

Two midterm tests and a small project task. The final result based on the average of the tests. For the final mark the small project task shall be accepted.

19. Opportunity for repeat/retake and delayed completion

One test can be retried and the small project task can be delayed submitted at the end of the semester

20. Learning materials

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Intelligent transport systems**				
2. Subject name in Hungarian	Intelligens közlekedési rendszerek			**3. Role**	
4. Code	**KOKUM205**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**0 practice**	**2 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	18 hours	**Homework**	12 hours
Reading written materials	46 hours	**Midterm preparation**	8 hours	**Exam preparation**	10 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Tóth János
12. Lecturers	Dr. Tóth János, Dr. Esztergár-Kiss Domokos, Soltész Tamás

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Keywords of intelligent transport systems. ITS directive of EU. Classification of ITS systems based on transport modes. Tasks of a mobility management system, the structure of the integrated transport database. EU standards. The NESZIP an NEJP systems. Features of Demand Responsive Transport, area of use, classification of systems. Rout planning of DRT, economic features. Hungarian and international best practices.

15. Description of practices

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16. Description of laboratory practices

Introduction to GIS, QGIS practice, Location based services, Route planning methods, Multimodal journey planners, Mobility as a Service, Transportation databases and data collection systems, Homework presentations.

17. Learning outcomes

a) knowledge: Familiar with types and features of ITS, the relevant terms and standards. Knows the attributes and advantages of multimodal systems. Knows the conditions of development demand responsive transport. b) skills: Ability to apply of GIS in planning of ITS systems. Able to examine and analyse ITS systems. c) attitude: Strive to acquire the highest level of system approach. d) autonomy and responsibility: Responsible applies of acquired knowledge in individual or in team work.

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

Signature: 1 midterm test from the theoretical and 1 midterm test from the practical part, 2 homeworks (QGIS and LBS), 1 presentation from the QGIS homework. Final grade equals to the result of written exam.

19. Opportunity for repeat/retake and delayed completion

Both midterm test correction possibility and possibility of delayed deadline for home work.

20. Learning materials

Presentation slides

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Management of transport and logistic services**				
2. Subject name in Hungarian	Közlekedési és logisztikai szolgáltatások menedzselése			**3. Role**	
4. Code	**KOKGM217**	**5. Evaluation type**	**e**	**6. Credits**	**6**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	56 hours	**Preparation for seminars**	12 hours	**Homework**	32 hours
Reading written materials	20 hours	**Midterm preparation**	24 hours	**Exam preparation**	36 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Nagy Zoltán
12. Lecturers	Nagy Zoltán

13. Prerequisites	Transport Economics (KOKGM201), co-requisite; - (-), -; - (-), -

14. Description of lectures

Features of transport and logistics services markets. Identifying factors that determine the needs for transport and logistic services. Methods for determining demand. Quantification of service quality. Defining and calculating KPI numbers.

15. Description of practices

Development of a transport or logistics service performance indicator system.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: the student is familiar with the characteristics of transport and logistics service markets, the methods used to determine the demand, the theoretical and practical solutions for quantifying service quality, and the steps to develop a complex service performance indicator system.

b) skills: The student can evaluate the most important problems to be solved in the transport and logistics system, select and define the appropriate KPI indicators for the evaluation. c) attitude: the student strives for completeness in the acquisition of knowledge, open to new and innovative ideas and research. d) autonomy and responsibility: the student carries out own solutions, able to make responsible decisions independently and execute them with attention to the effects and consequences of the decisions.

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

Requirements for signature: fulfilment of the midterm test, homework document (in approx. 20 pages) and presentation of a special topic. There is a verbal examination at the end of the semester. Weights of requirements in final mark: midterm test (25%), homework document and presentation (25%), verbal examination (50%).

19. Opportunity for repeat/retake and delayed completion

It's possible to retake the midterm test, the written homework and presentation can be delayed completion till end of delayed completion period.

20. Learning materials

Presentation slides and electronic course material.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Material handling and warehousing processes**				
2. Subject name in Hungarian	Anyagmozgatási és raktározási folyamatok			**3. Role**	
4. Code	**KOALM225**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	45 hours
Reading written materials	13 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Material Handling and Logistics Systems
11. Responsible lecturer	Dr. Kovács Gábor
12. Lecturers	Dr. Kovács Gábor, Dr. Sztrapkovics Balázs

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The specific properties and main groups of the material handling systems. Characteristics of the material handling systems, the main groups, material handling tasks, material flow characteristics. The main groups of material handling machines and techniques. Performance and reliability of the material handling systems. Calculation of the material handling time. Material handling process examination. Secondary analysis, layout planning. Conventional storage systems, high bay warehouse systems. Order picking. Statistical sampling procedures. The functions of the packaging, packaging nation's economic role. The classification of packaging, packaging materials - different materials, packaging materials, packaging accessories. Cargo unit creation. Tenders.

15. Description of practices

Application of material handling and storage system analysis methods through practical examples.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- Knowledge of funds related to material handling systems.
- Knowledge of funds related to storage systems.
- Knowledge of funds related to packaging technology.

b) skills:
- Understand of the material handling systems, to describe their operation and to perform simpler related tasks.
- Understand of the storage systems, to describe their operation, and to perform simpler related tasks.
- Carrying out of simpler packaging design tasks.

c) attitude:
- Strive to maximize their abilities to make their studies at the highest possible level, with a profound and independent knowledge, accurate and error-free, in compliance with the rules of the applicable tools, in collaboration with the instructors.

d) autonomy and responsibility:
- Take responsibility for the quality of the work and the ethical standards that set an example for the classmates, using the knowledge acquired during the course.

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

Passing the two test (50-50%)

19. Opportunity for repeat/retake and delayed completion

The tests can be retaken twice.

20. Learning materials

Students can download the subject notes in pdf format via Moodle.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Mathematics MK**				
2. Subject name in Hungarian	Matematika M1 közlekedésmérnököknek			**3. Role**	
4. Code	**TE90MX59**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for seminars**	28 hours	**Homework**	0 hours
Reading written materials	32 hours	**Midterm preparation**	4 hours	**Exam preparation**	0 hours

10. Department	Institute of Mathematics
11. Responsible lecturer	Dr. Sági Gábor
12. Lecturers	Dr. Sági Gábor, Dr. Kiss Sándor

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Basic concepts of graph theory. Euler Roads, Euler Circles. Hamiltonian Roads and Hamiltonian Circles, a necessary condition for their existence: components that are created after deleting points. Satisfactory conditions: Dirac's and Ore's theorems. Search for the shortest way. Width traversing, the shortest route search solution is unexploded. The Experienced Case, Dijkstra, Ford, Floyd Algorithms. Network Flow Tasks. Cuts and capacities. Correction Path, Ford-Fulkerson theorem, Edmonds-Karp theorem, full-fledged lemma. Menger of the number of edge-off paths running between the given vertices. Resource mapping problem. Pair graphs and chromatic number concept, even graphs with odd long circles. Moho coloring. Couples, need or full pairing concept. Maximum pair in paired graphs: Correction Paths, König's theorem about the relationship between the size of a pairing and a minimal set of points. Tutte's theorem (proving necessity, demonstration of satisfaction is optional; problem of mapping). Dual, graphical graph of graphs. Estimates of chromatic numbers: degree, clique size, Mycielski construction. Plane, spherical, space-drawing. Stereographic projection. Euler's polyhedron theorem. Chromatic daily graphs of plane graphs (example: 3-chromatic plane graph, 6-color theorem, 5-color theorem). Event Algebra, Nominal Algebra, Probability Variables, Law of Big Numbers, Central Border Distribution. stochastic processes. Markov chains, Markov processes. Special stochastic processes for characterizing technical systems: Poisson process, recursive process, semi-Markov process. Wiener-Hinchin pairs, ergodicity.

15. Description of practices

Application of theoretical knowledge through different tasks.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:

- The student acquires the basics of graph theory and the theory of stochastic processes. Knows the basic concepts of these areas and the basic (mathematical) items related to them.
- Knows some of the methods of solving problems with graphical and stochastic processes inspired by applications.
- Is aware of the techniques associated with the computerization of these methods and their effectiveness and limits of applicability.

b) skills:

- In the mathematical models he is familiar with, he can accurately orient and communicate with these models.
- Is able to get acquainted with similar models, problems and methods, which are known in the literature but are not included in the curriculum, with independent work.
- Some practical problems are able to create a graph theory or stochastic model. Recognizes that the problem (inspired by engineering practice) can be easily solved by the learned methods.
- Is able to formulate accurate questions in the field of graph theory and stochastic problems in the personal interest of IT and mathematical experts; is able to interpret the answers of these experts.

c) attitude:

- Continuously cooperates with the instructor and actively participates in the processing of the study material.
- Open to mathematical modeling, precise, logical thinking.
- Seeks to synthesize the knowledge acquired during the course with the knowledge and competences of other subjects.
- Open for communication with other scientists (mathematicians, informatics).
- Strives for accurate, error-free task solving.

d) autonomy and responsibility:

- Uses the learned methods independently.

- In the practical application of your knowledge, you choose the appropriate mathematical models with great care. He is aware of the nature and the magnitude of the decisions made in the calculation of these models. He is responsible for selecting, calculating, and relying on these models.

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

Two midterm tests, the midterm grade is the average of the two test results.

19. Opportunity for repeat/retake and delayed completion

Both midterm exams can be retried once.

20. Learning materials

Katona Gyula., Recski András., Szabó Csaba., A számítástudomány alapjai (in Hungarian), Typotex Kft., 2002
Szász Gábor, Matematika III (in Hungarian), Tankönyvkiadó, Budapest, 1989
Michelberger Pál, Szeidl László, Várlaki Péter, Alkalmazott folyamatstatisztika és idősor-analízis (in Hungarian), Typotex Kft., 2001

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Meteorology**				
2. Subject name in Hungarian	Meteorology			**3. Role**	
4. Code	**KOVRM231**	**5. Evaluation type**	**e**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	0 hours
Reading written materials	36 hours	**Midterm preparation**	12 hours	**Exam preparation**	10 hours

10. Department	Department of Aeronautics and Naval Architecture
11. Responsible lecturer	Dr. Rohács Dániel
12. Lecturers	Dr. Rohács Dániel, Jankovics István

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

ATMOSPHERE – Structure of the atmosphere. Properties of atmosphere . The International Standard Atmosphere.
VISIBILITY – Basics, Humidity, Haze, Measurement
CLOUDS, PRECIPITATION – Cloud formation. Convection. Cloud Classification. Precipitation,
WINDS, THUNDERSTORMS, ICING – WINDS. Measurement. Forces. Wind Gradient. Thunderstorms, Supercells, Dangers of thunderstroms.
AIR MASSES AND WEATHER FRONT– Warm front. Cold Front. Occlusion. Stationary front. Convergence and squall lines.
GLOBAL CLIMATOLOGY - Climatology. Jetstream. Low and High pressure areas..
WEATHER REPORTS – Weather infromation. Weather Reports and Forecasts (METAR, TAF and others)

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: Familiar with the meteorological processes affecting Air Traffic, know and understand their impact on aviaton safety. Knows the weather reporting and forecasting methods used in aviation.
b) skills: Ability to assess the impact of a given weather phenomenon on flight, from the point of view of aviation safety, economy and operation. Can interpret different flight meteorological messages.
c, d) attitude, automony and responsibility: Interested, responsive, making decisions with care and responsibility.

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

Mid-term requirement: Performing laboratory excercises and 1 mid term exam
Final grade: 1 exam measuring the theoretical knowledge. The final grade is the result of the exam

19. Opportunity for repeat/retake and delayed completion

Retake possibility of a laboratory excercise or the mid-term exam
Retake exam possible according to the general rules of BME

20. Learning materials

The presentation about the lectures
Literature

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Modelling and control of vehicles and traffic systems**				
2. Subject name in Hungarian	Járműforgalmi rendszerek modellezése és irányítása			**3. Role**	
4. Code	**KOKAM233**	**5. Evaluation type**	**e**	**6. Credits**	**6**
7. Weekly contact hours	**2 lecture**	**3 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for seminars**	16 hours	**Homework**	34 hours
Reading written materials	23 hours	**Midterm preparation**	12 hours	**Exam preparation**	25 hours

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

13. Prerequisites	- (-), -

14. Description of lectures

Air Transport:

Basic units of air traffic control. Air-ground communication ACC, APP, TMA. ACARS DATALINK. Airport transport systems. Modeling systems of civil aviation related to flow management. Civil aviation and air traffic control planning.

Road traffic:

Structure and operation of road traffic control systems. Characterization of road traffic, measurement of traffic technology parameters. Urban and highway traffic management theory: strategies, tools, software.

Road Measurement Technology: Smoothing, Filtering, Forecasting, Recursive Least Square Estimator, Kalman Filter, Moving Horizon Estimation.

Modeling and managing urban traffic: Store-and-forward model, LQ and MPC control.

Modeling and managing motorway traffic: LWR model, shock wave modeling, PID, LQ, nonlinear MPC methods.

Rail transport:

The task of railway traffic management, the levels of operation. Tools for scheduling planning and control. Positive and operative management tasks and solutions. The interlocking device as the basis for operational control. Special cases of train tracking, solutions. Train Track Control Solutions, Connection to Automatic Signaling, Disposal Criteria, Planning. Modeling of traffic management. Design of traffic control systems. Tools to support design.

15. Description of practices

A specific design task, simulation problems

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- is familiar with the structure and operation of traffic control systems,
- knows the levels and methods of traffic modeling

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) attitude:
- open to research traffic management systems

d) autonomy and responsibility:
- can independently design traffic control

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

Requirements: successful completion (min. 50%) of the midterm and submission of the seminar project report. The exam is the presentation of the seminar project. The final grade is calculated as the average of the mid-term and the seminar reporting activity.

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

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Numerical methods**				
2. Subject name in Hungarian	Numerikus módszerek			**3. Role**	k
4. Code	**KOVRM121**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**0 practice**	**1 lab**	**8. Curriculum**	**AJK**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	11 hours	**Homework**	20 hours
Reading written materials	35 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Aeronautics and Naval Architecture
11. Responsible lecturer	Dr. Rohács József
12. Lecturers	Dr. Bicsák György

13. Prerequisites	- (-), -

14. Description of lectures

Introduction: scope of lectures, content and requirements. System analysis, model generation, modelling and simulation. General models, simplifications. Source of errors, model types and solution possibilities. Analytic, geometric and numerical solutions. Functions, vectors, matrices, basic operations. Classical and floating-point error-calculation. Sensitivity and numerical stability. Investigation of solution technics. Representing the solutions, evaluation. Solution of system of equations. Single variable, non-linear equations. Successive approximation, Newton iteration and secant method. Solution of polynomial equation. Horner method and Newton-method. Numerical solution of linear system of equations. Gauss-elimination and LU decomposition. Numerical solution of Eigenvalue problem. Extremum problems, optimization. Linear programming, simplex method. Optimization of non-linear functions. Non-linear programming. Gradient method. Functions, series of functions, approximation. Taylor series, MacLaurin series, Fourier series. Polynomial-interpolation, Newton, Lagrange and Hermite interpolation. Application of Splines. Generating curves and surfaces with using Splines. Bezier polynomials, NURBS surfaces. Approximation, Chebyshev and Padé approximation. Harmonical analysis, fast Fourier transformation (FFT). Numerical differentiation, integration. Approximation of derivatives using finite difference method. Approximation of derivatives using Lagrange and Newton interpolation formulas. Numerical integration, general quadrature formula. Trapezoidal and Simpson formula. Romberg iteration. Initial value problems, ordinary differential equations. Explicit formulas: Euler method, 4th order Runge-Kutta method. Implicit formulas, predictor-corrector methods. Approximation of partial differential equations. Boundary conditions, finite difference method, finite volume method, finite element method. Stochastic process modelling. System input data generation. Monte-Carlo simulation.

15. Description of practices

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16. Description of laboratory practices

MATLAB application of the introduced methods.

17. Learning outcomes

a) knowledge: knowing the fundamentals of numerical approximation methods used in engineering instead of analytic algorithms. Knowing to find and apply the most suitable numerical method for a certain problem.

b) skills: can implement different algorithms to a programming language and to find the best approximation method for a given mathematical problem.

c) attitude: interested, responsive

d) autonomy and responsibility: can work individually and in teamwork

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

2 midterm exams from the theoretical part, 50 points / exam. 1 project work for a group of 4-5 students, for n*100 points (n is the number of students). The points can be divided between the group members according to their whish. Grade calculation: summing all the points, the total points gives the final grade as follows: 0 – 79 - 1; 80 – 109 - 2; 110 – 139 - 3; 140 – 169 - 4; 170 – 5

19. Opportunity for repeat/retake and delayed completion

Because of the point-collection system, no minimum points are determined for the midterm exams or for the project work. The retake possibilities are the following: on the replacement week the 1st midterm exam, or the 2nd midterm exam can be tried again for 50 points, or a combined 1st+2nd midterm exam retake for 100 points.

20. Learning materials

Examples, documents and training materials, given out during lectures, presentations.
György Bicsák, Dávid Sziroczák, Aaron Latty: Numerical Methods
Ramin S. Esfandiari: Numerical methods for engineers and scientists using MATLAB, ISBN 978-1-4665-8570-6
Erwin Kreyszig: Advanced engineering mathematics, 10th edition, ISBN 978-0-470-45836-5

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Passenger transportation**				
2. Subject name in Hungarian	Személyközlekedés			**3. Role**	
4. Code	**KOKUM208**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**0 practice**	**2 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	15 hours	**Homework**	34 hours
Reading written materials	20 hours	**Midterm preparation**	15 hours	**Exam preparation**	10 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Csiszár Csaba
12. Lecturers	Dr. Csiszár Csaba, Dr. Csonka Bálint, Dr. Földes Dávid

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Characterisation, attributes and planning method of passenger transportation systems. Classi-fication of passenger transportation modes. Modelling the journey process in context of set-tlement structure. Creating travel chains. Multi-criteria analyses of passenger transportation systems. Quality assessment and service standards of passenger transportation. Planning of elements and processes of passenger transportation both in the individual and the public transport (e.g.: timetable). Implementation of intermodal and interoperable systems; passenger transport integrated by telematics tools. Sustainable transport planning, preconditions of the sustainability; soft mobility forms and their infocommunication support. Overview of the advanced, so called "transitional" passenger transportation modes (e.g. car-sharing, bike-sharing, car-pooling, chauffeur service, demand responsive transport) in system and process-oriented approach.

15. Description of practices

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16. Description of laboratory practices

Learn and practice the measurement, analysis and planning methods. Case studies. Independ-ent literature research supported by consultations. Student presentations. The students elaborate (individually and/or in teamwork) assignments. The task results should be presented.

17. Learning outcomes

a) knowledge: The students know structure and operation of passenger transportation systems. b) skills: They are able to analyse and design passenger transportation systems and operational processes. c) attitude: The students strive for precise and errorless task accomplishment. d) autonomy and responsibility: They apply the knowledge with responsibility; they are able to work independently or in a team according to the situation.

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

The students write 2 midterms (with theoretical and practical parts) and submit student assignments. The mid-semester signature is obtained if both midterms are passed (at least half of the maximal scores) and all student assignments are submitted and accepted (at least half of the maximal scores). The semester is finished by oral exam. The final mark contains the mid-semester performance in 50%.

19. Opportunity for repeat/retake and delayed completion

The midterms can be retaken according to Code of Studies. The student assignments can be submitted after deadline (if extra fee is paid).

20. Learning materials

ppt slides, Csaba Csiszár – Bálint Csonka – Dávid Földes: Innovative Passenger Transportation Systems (book)

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Project**				
2. Subject name in Hungarian	Közlekedésautomatizálási projekt feladat			**3. Role**	
4. Code	**KOKAM242**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**0 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	8 hours	**Homework**	50 hours
Reading written materials	4 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Bartha Tamás
12. Lecturers	Dr. Bartha Tamás

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

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15. Description of practices

Individual planning assignments, sloving and demonstrating by the end of the semester. Topics related to the designing tasks.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
b) skills:
- capable of breaking down a project task into elements based on specification,
- is able to design a development process,
- is able to track and document a development process

c) attitude:
- is open to independently carry out development tasks

d) autonomy and responsibility:
- is able to make responsible decisions in a development project

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

The completed and documented work will be presented by the student at the end of the semester, this is the basic for the midterm grade.

19. Opportunity for repeat/retake and delayed completion

The individual task cannot be delayed completed.

20. Learning materials

Slides

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Projectmanagement in transportation**				
2. Subject name in Hungarian	Közlekedési projektirányítás			**3. Role**	
4. Code	**KOKKM241**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	10 hours
Reading written materials	6 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Nagy Zoltán
12. Lecturers	Nagy Zoltán

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Specialities of transport projects. Defining project goals. Identifying stakeholders. Methodology for preparing preliminary feasibility studies. Accounting and defining the necessary resources, budget management, time management, scheduling. Risks analysis and management of implementation . Development of project strategy, external-internal communication.

15. Description of practices

-

16. Description of laboratory practices

-

17. Learning outcomes

a) knowledge: the student learns the basics and goals of project management, about the design of transport projects and the rules, is aware of the processes of work breakdown structure (WBS), scheduling, resource and cost estimates, the methods of risk management, knows the applicable communication techniques.

b) skills: the student can define goals and project environment, has the capability of measuring progress, balancing project resources and risks and the capability of effective project communication.

c) attitude: th estudent thinks in komplex manner, recognizes the need for project management, works in a group independently on a high level, looks for cooperation with professionals in connected areas.

d) autonomy and responsibility: the student carries out own solutions, able to make responsible decisions independently, and execute them in consultation with the project stakeholders and attentive to the effects and consequences of the decisions.

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

1 midterm test, 1 (team) homework, weights of requirements in final mark: result of midterm test (50%), homework document and presentation (50%).

19. Opportunity for repeat/retake and delayed completion

Midterm test correction possibility for those not present on the test, possibility of delayed deadline for home work.

20. Learning materials

Presentation slides and electronic course material.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Road Safety**				
2. Subject name in Hungarian	Közlekedésbiztonság			**3. Role**	
4. Code	**KOKKM222**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	20 hours
Reading written materials	8 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Sipos Tibor
12. Lecturers	Dr. Sipos Tibor, Dr. Szabó Zsombor

13. Prerequisites	- (-), -

14. Description of lectures

The road safety indicators. Development of road safety indicators in Europe and in Hungary. Characteristics of the traffic actors (human, infrastructure, vehicles and regulation), their impact on road safety. Review of the traffic regulation. Features of secure infrastructure. Features of passive and active vehicle safety systems. Human factors of traffic safety, traffic behaviour. Advanced methods of driver training, best practices. Characteristics of pedestrian and cycling traffic.

15. Description of practices

Statistical analysis of the road accidents. Black spot analysis. Developing Safety Performance Functions and Accident Prediction Models. Network Wide Road Safety Assessement. Assignment: study on road safety, written summary and presentation, in a group of 2-3 people.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: - Knows the most common indicators of traffic safety in Hungary and in Europe. - Knows the laws related to road safety. - Knows the aspects and methods of safe infrastructure design. - Knows the operation of the active and passive safety systems of vehicles and their impact on road safety. - Knows the human factors of traffic safety, the behaviour of traffic. - Knows modern driver training methods.

b) skills: - Able to evaluate the development of indicators for the classification of traffic safety. - Able to investigate road infrastructure from the point of view of road safety, to elaborate proposals for improvement of traffic safety. - Able to develop interventions that affect transport behaviour.

c) attitude: - Participates in lectures and exercises, prepares assignment study on time. - During the lectures, he/she is actively involved in processing the current topic. - Works with the quality of expect from an engineer. - In the course of the assignment study, he/she seeks to develop new technical solutions. - Participates in a professional debate following his/her lectures. - Watches with interest the development of road safety. - Open to learn new knowledge.

d) autonomy and responsibility: - Applies the knowledge acquired in the course of the course with responsibility. - Can independently develop new technical solutions. - Accepts the framework for collaboration, can do its job independently or as part of a team, depending on the task.

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

One midterm exam (50%) and an study paper and presentation (50%).

19. Opportunity for repeat/retake and delayed completion

Midterm exam can be retaken until the end of delayed completion period. The study paper cannot be delayed submitted and presented.

20. Learning materials

Slides, necessary literature and other materials are accessible from the Moodle platform.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Safety in air traffic control**				
2. Subject name in Hungarian	Safety in air traffic control			**3. Role**	
4. Code	**KOKAM243**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	0 hours
Reading written materials	40 hours	**Midterm preparation**	18 hours	**Exam preparation**	0 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Meyer Dóra
12. Lecturers	Dr. Meyer Dóra

13. Prerequisites	- (-), -

14. Description of lectures

Organizational and regulatory environment of Air traffic control. Basic concepts of aviation safety. Safety assesment model (SAM, phase breakdown, tasks for each phase, FHA, PSSA, SSA, process for requesting relevant system requirements, hazard and risk analysis, system specification, system architecture definition, testing, commissioning, monitoring, verification and validation of the change process, certification, licensing, documentation). Flight safety criteria: system requirements, safety requirements, safety certification. Security Analysis Methodologies for Air Traffic Control Security Verification: Hazard Analysis Methodologies. Risk analysis. Consequences of faulty operation - determination of severity. Risk classification. Human factors of aviation safety. Safety requirements for software used in air traffic control. Hardware redundancies used in air traffic control. Event reporting systems. Event Investigation Process. Operational areas highlighted in terms of aviation safety.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- knows the aviation safety strategy policies and methods;
- knows the principles and procedures of hazard and risk analysis of aviation safety;
- knows the EUROCONTROL SAM process and tools;
- knows the legal background of aviation related incident investigation and the incident investigation process;
- knows the incident reporting processes, systems, surfaces;
- knows the ATM SMS with legal background;
- knows the ICAO defined safety promotion activities;
- knows the ISQMS;

b) skills:
- Is capable of analyzing, specifying, developing safety management systems, subsystems in the field of air traffic control;

c) attitude:
- is interested in modern aviation safety solutions;
- capable of thinking in support of algorithmic safety hazard and risk analysis, which can be applied in other high security areas;
- participates in solving aviation safety problems in the field of air traffic control, works efficiently and willingly to work with specialists in other fields;

d) autonomy and responsibility:
- is also able to apply the knowledge acquired here to other systems unknown to it.

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

Three midterm exams, all must be sufficient , final semester mark is the rounded up average of the three midterm exams.

19. Opportunity for repeat/retake and delayed completion

Two midterm exams can be retried

20. Learning materials

Lecture Notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Signal processing in transport**				
2. Subject name in Hungarian	Jelfeldolgozás a közlekedésben			**3. Role**	
4. Code	**KOKAM211**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	12 hours	**Homework**	7 hours
Reading written materials	43 hours	**Midterm preparation**	12 hours	**Exam preparation**	20 hours

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Szabó Géza
12. Lecturers	Lövétei István

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Characteristics of micropocessors, internal architectures, operation modes. Linear and interruption controlled functionning. Characteristics of microcontrollers, the MCS-51 architecture. Internal registers, instruction set.

Realization of the serial communication by microcontroller: RS-232, RS-485, fail-safe RS-485, CAN. Data protection, secure data transfer. A/D and D/A converters. Filtering of digital signals. Digital Signal Processors (DSPs). Software development processes, safety-related software development. Safety relted HW and SW systems. Samples in transportation applications.

15. Description of practices

In practices, every student programs an own microprocessor type Intel-8051, on a computer based developping environment. In the first half of the semester (weeks 1-7) the ASM, in the seond half of the semester (weeks 8-14) the C is the used programming language.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:
- knows the basics of building embedded systems
- knows the basic serial communication techniques
- knows the basic principles of A / D and D / A conversion
- knows basic signal processing algorithms

b) skills:
- capable of programming embedded systems
- is able to design data collection systems

c) attitude:
- is interested in modern IT solutions

d) autonomy and responsibility:
- is able to apply the knowledge acquired here to other similar, yet unknown systems.

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

In the study period 2 midsemester exams and one homework, all of them are the prerequisites of the signature, and consequently of the final exam. The final result is the 1/3 - 2/3 ratio of the study period performance (within the ratios: 1/3 for 1st midterm, 1/3 for 2nd midterm, 1/3 for homework) and the exam note.

19. Opportunity for repeat/retake and delayed completion

All tasks can be retried based on the Code of Studies.

20. Learning materials

Lecture notes

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Smart City**				
2. Subject name in Hungarian	Intelligens városok - Smart city			**3. Role**	
4. Code	**KOKKM227**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	20 hours
Reading written materials	26 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Esztergár-Kiss Domokos
12. Lecturers	Dr. Esztergár-Kiss Domokos, Dr. Tóth János

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Paradigm shift in urban citizen life. Smart city introduction, evaluation and ranking methods. City planning aspects, methods and strategies. Introduction to land use functions and models. Shared spaces, public space transformation. Utilization of information received from social media and mobility patterns. Big data and Internet of Things solutions. Smart Grids and its applications. Top international and Hungarian best practices.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: Familiar with the Smart City concept, urban planning models, social media types, mobility patterns, Big Data data types, the Internet of Things model and features; b) skills: Able to define Smart City features, use assessment methodologies, apply land use models, use road planning principles, use Big Data approaches, distinguish between Smart Grid elements; c) attitude: maximizing abilities, extends the knowledge by their own, strives for precise task solving; d) autonomy and responsibility: Responsible applies of acquired knowledge in individual or in team work.

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

2 midterm tests (50%), 1 homework (50%)

19. Opportunity for repeat/retake and delayed completion

Midterm test correction possibility for those not present on one of the tests, possibility of delayed deadline for home work.

20. Learning materials

Presentation slides and electronic lectrue notes.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Strategic policy instruments in transportation**				
2. Subject name in Hungarian	Stratégiai szabályozási eszközök a közlekedésben			**3. Role**	
4. Code	**KOKGM215**	**5. Evaluation type**	**e**	**6. Credits**	**6**
7. Weekly contact hours	**4 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	56 hours	**Preparation for seminars**	14 hours	**Homework**	30 hours
Reading written materials	40 hours	**Midterm preparation**	20 hours	**Exam preparation**	20 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc

13. Prerequisites	Transport Economics (KOKGM201), co-requisite; - (-), -; - (-), -

14. Description of lectures

Within the framework of the subject, students will learn about the European Union's acquis communaires and upcoming harmonization tasks in transportation. An overview of the most important strategic objectives for transport at European level, the most important strategic objectives announced in the EU common transport policy, and European directives calling for an integrated, interoperable, multi-modal transport development and system efficiency policies that support these objectives. Getting to know the most important national transport strategy objectives deriving from the community goals and the related national policy system. Assessment of policy experiences in the transportation system, identification of factors hindering the adaptation of European practice, and the identification of strategic tasks to eliminate implementation barriers. Possibilities for transfer of national experiences at European and Member State levels. The course focuses on policy issues related to the use of transport infrastructure, deals with rail regulatory packages and institutional reforms, introduces the most important steps for EU-compatible conditions, financing and toll collection, for rural and urban transportation, here especially for public transport. The subject outlines the expected impacts and tasks related to the introduction of transportation pricing principle based on the social costs.

Introduction to transport policy, mode specific directives that support reaching the strategic goals of integrated, interoperable, multimodal transportation development and operation. Infrastructural, legal, economic, financial, pricing, social and institutional frameworks of transportation. Barriers and incentives of adapting best practices in transportation policy. The main research, development and innovation directions in transportation.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: the student is familiar with the process of transport policy formulation and strategy making and the necessary technical, legal, financial, economic, social and institutional frameworks, as well as with the related research and development and innovation directions.

b) skills: The student is able to identify the most important problems to be solved in the transportation system, to select the transport policy instruments for their management and to evaluate the results, impacts and the development needs of the transport policy instruments.

c) attitude: The student strives for completeness in the acquisition of knowledge, co-operates with the teacher and the other students, is open towards new and innovative ideas, researches and uses information technology and computing tools for its work.

d) autonomy and responsibility: in addition to the narrow professional aspects, the student also takes into account social aspects in the utilization of its knowledge, asks for the professional opinions of others, makes responsible decisions in the selection of the most efficient transport policy tools, and takes care of the challenges responsibly.

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

Requirements for signature: successful completion (min. 50%) of the three midterms, report and submission of two seminar report about a general and a specific transport policy topic. There is a verbal examination at the end of the semester. Weights of requirements in final mark: seminar reporting activity (10-10%), average of midterms (30%), verbal examination (50%).

19. Opportunity for repeat/retake and delayed completion

There are retakes from each midterms, the written reports can be delayed completed till end of delayed completion period.

20. Learning materials

Peter Stopher, John Stanley (2014) Introduction to Transport Policy: A Public Policy View. Edward Elgar Publishing

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Supply and distribution processes**				
2. Subject name in Hungarian	Ellátási-elosztási folyamatok			**3. Role**	
4. Code	**KOALM240**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**1 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	6 hours	**Homework**	15 hours
Reading written materials	5 hours	**Midterm preparation**	6 hours	**Exam preparation**	0 hours

10. Department	Department of Material Handling and Logistics Systems
11. Responsible lecturer	Dr. Kovács Gábor
12. Lecturers	Dr. Kovács Gábor, Lénárt Balázs

13. Prerequisites	Material handling and warehousing processes (KOALM225), strong; - (-), -; - (-), -

14. Description of lectures

The basics of organizing supply chains (SCM), enterprise logistics system. The organization of the material supplies, material analysis methods (ABC, XYZ), supply strategies (synchronized, by stocking, on request), material planning methods (Gozinto graph, BOM). The inventory systems and processes (rotation indicators), inventory valuation (FIFO), inventory model (EOQ). Distribution systems, demand forecasts (simple methods). Production logistics (MRP, APS, Kanban, Lean).

15. Description of practices

Application of supply chain analysis methods through practical examples, and preparation of the solution of the homeworks.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge:

- Knowledge of basics related to supply chain systems.
- Knowledge of basics involved in the analysis of supply chain systems.

b) skills:

- Analyzes of supply chain systems.
- Individual evaluation and proposal related to supply chain systems.

c) attitude:

- Strive to maximize their abilities to make their studies at the highest possible level, with a profound and independent knowledge, accurate and error-free, in compliance with the rules of the applicable tools, in collaboration with the instructors.

d) autonomy and responsibility:

- Takes responsibility for the quality of the work and the ethical standards that set an example for the classmates, using the knowledge acquired during the course.

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

1 homework (50%), 1 test (50%)

19. Opportunity for repeat/retake and delayed completion

Homework can be resubmitted once. Test can be retaken once.

20. Learning materials

Students can download the subject notes in pdf format via Moodle.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Trade, Financial, Accounting Techniques**				
2. Subject name in Hungarian	Kereskedelmi, pénzügyi és számviteli technikák			**3. Role**	
4. Code	**KOKKM138**	**5. Evaluation type**	**e**	**6. Credits**	**3**
7. Weekly contact hours	**1 lecture**	**1 practice**	**1 lab**	**8. Curriculum**	**KL**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	16 hours	**Midterm preparation**	12 hours	**Exam preparation**	12 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The aspects of foreign trade transportation: foreign economic theories, regulatory framework, structure, elements, creation and implementation of the foreign trade contract. Foreign trade payment methods, the role of the forwarder. Banking operations, assets, securities required for carrying out transport services. Role and function of the stock markets. Elements of the accounting system of transport companies, basic rules. Accounting rules, operations. Types and elements of Reports.

15. Description of practices

Solving financing and accounding tasks of freight forwarding.

16. Description of laboratory practices

Elaboration of seminar tasks on computer.

17. Learning outcomes

a) knowledge: the student is familiar with the rules of internal and external trade in freight forwarding, the macro-financial framework for companies and the basic accounting rules.

b) skills: the student is able to select the appropriate commercial solutions, recognizes the opportunities offered by financial transactions, and interprets the outputs of the corporate accounting system.

c) attitude: the student strives for completeness in the acquisition of knowledge, co-operates with the teacher and other students, is open to new and innovative ideas, researches, and uses information technology and computing tools for its work.

d) autonomy and responsibility: the student makes responsible decisions in the preparation and proceeding of commercial transactions, asks for professional opinions of others in its work, and manages the challenges responsibly.

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

Requirements for signature: fulfilment of three midterms. There is a written examination at the end of the semester. Weights of requirements in final mark: average of midterms (50%), verbal examination (50%).

19. Opportunity for repeat/retake and delayed completion

There are retakes from each midterms, they can be delayed completed till end of delayed completion period.

20. Learning materials

- Bokor, Zoltán; Mészáros, Ferenc; Batta, Gábor (2016) Introduction to Finance (in Hungarian). Course book, BME Dept. of Transport Technology and Economics
- Bokor, Zoltán; Csarejs, Angelika (2016) Introduction to Accounting (in Hungarian). Course book, BME Dept. of Transport Technology and Economics
- Bokor, Zoltán (2010) Introduction to Foreign Trade (in Hungarian). Course book, BME Dept. of Transport Technology and Economics

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Traffic flow**				
2. Subject name in Hungarian	Közlekedési áramlatok			**3. Role**	
4. Code	**KOKUM204**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	12 hours	**Homework**	27 hours
Reading written materials	25 hours	**Midterm preparation**	14 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Kisgyörgy Lajos
12. Lecturers	Dr. Kisgyörgy Lajos, Kózel Miklós, Soltész Tamás

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Stochastic parameters of road traffic flow and their relations. Characteristics and states of road traffic. Characteristics of intersections, signalized networks and their evaulation.

Transport application of operations research methods and artificial intelligence (AI). Description of general queuing procedures.

Evaulation of travel chains in urban transport. Correlation between public transport flow parameters. Characteristics of pedestiran flows, measurement techniques.

15. Description of practices

Indroducing measurements and data analysis methods according to individual and group excercises.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: Knows the characteristics, states and relations of pedestrian, road and public transport flows. Knows the coordination and evaluation methods of traffic flows in signalized intersections. Knows methods for the evaluation of travel chains in urban transport. Knows optimalization methods can be applied in transport and the basics of queueing theory.

b) skills: Able to apply and elaborate methods for the qualification and improvement of traffic flow through various transport modes. Able to elaborate traffic survey methods to describe pedestrian, road and public transport flows. Able to evaluate procedures, describe them numerically and design service facilities with the aim of queueing theory.

c) attitude: Applies the indices and qualification systems for the evaluation of transport systems which describe traffic flow progress the best. Applies adequate optimalization methods in planning of transport systems' improvement. Aims to apply/elaborate methods for the qualification of transport systems which describe the examined system well, required data can be understood easily and recorded with slight resources.

d) autonomy and responsibility: Able to elaborate technical problems on high standards alone or as a group member, as well. Feels responsibility for the result and standard of their work; aims to describe reality as close and accurate as possible when describing transport systems; aims to achieve optimal operation during the improvement of transport systems.

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

Achievement of minimum satisfactory level on all 3 midterms and fulfilment of minimum 3 chosen individual or group assignments that reach a minimum required point value in total. Specified assignments have to be presented, as well.

19. Opportunity for repeat/retake and delayed completion

3 retake opportunites in total for the 3 midterms, but each specific midterm can be retaken maximum twice. One upgrade possibility for each assignment until a new deadline.

20. Learning materials

Slides and collection of formulas in electronic form, videos, publications

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport automation**				
2. Subject name in Hungarian	Közlekedési automatika			**3. Role**	
4. Code	**KOKAM202**	**5. Evaluation type**	**m**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

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

10. Department	Department of Control for Transportation and Vehicle Systems
11. Responsible lecturer	Dr. Bartha Tamás
12. Lecturers	Dr. Baranyi Edit, Dr. Bartha Tamás, 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 laboratory practices

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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) attitude:
- 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 decisions

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

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport Economics**				
2. Subject name in Hungarian	Közlekedésgazdaságtan			**3. Role**	
4. Code	**KOKGM201**	**5. Evaluation type**	**e**	**6. Credits**	**4**
7. Weekly contact hours	**2 lecture**	**1 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for seminars**	8 hours	**Homework**	18 hours
Reading written materials	30 hours	**Midterm preparation**	12 hours	**Exam preparation**	10 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The emergence and evolution of modern transport systems. The transport strategy planning process. Transport policy in the European Union and Hungary. Efficiency assessment methods and their applications in transport. Interrelationships between economic, environmental and social sustainability objectives of transport and their modelling possibilities. Economic principles of sustainable mobility, price reform. Evaluation and pricing of the external impacts of transport, using road transport and public transport as examples. Specific economic and social issues of urban transport: information economics, parking management, transport development and land use interrelations.

15. Description of practices

Elaboration of sub-tasks related to cost-benefit analysis (CBA) (traffic forecasting, elasticity calculation, efficiency assessment) and presentation, individual consultation to prepare a seminar report consisting of sub-tasks.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: the student learns the different efficiency evaluation tools of transportation developments, the EU and Hungary's transport policy, the economic aspects of sustainable transport, the basic tools of pricing and tariff policy, the economic aspects of transport information utilization.

b) skills: The student is able to assess the most important problems to be solved in the transportation system, to select the most effective assessment methods based on sustainability aspects and to propose the most effective transportation development option.

c) attitude: the student strives for completeness in the acquisition of knowledge, cooperates with the teacher and other students, is open to new and innovative ideas, researches, and uses information technology and computing tools for its work.

d) autonomy and responsibility: the student takes social aspects into account in the utilization of its knowledge and asks for professional opinions of others in addition to the narrow professional aspects, makes responsible decisions in the selection of the most efficient transportation developments, and takes care of the challenges responsibly.

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

Requirements for signature: successful completion (min. 50%) of the two midterms, report and submission of the CBA homework. There is a verbal examination at the end of the semester. Weights of requirements in final mark: activity on classes (10%), homework (20%), midterm result (35%), verbal examination (35%).

19. Opportunity for repeat/retake and delayed completion

Midterm can be retaken, the howework can be delayed completed till end of delayed completion period.

20. Learning materials

- Eddy Van de Voorde, Thierry Vanelslander (2010) Applied Transport Economics, De Boeck
- André de Palma , Robin Lindsey , Emile Quinet , Roger Vickerman (2011) A Handbook Of Transport Economics, Edward Elgar
- presentation slides

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport informatics**				
2. Subject name in Hungarian	Közlekedési informatika			**3. Role**	
4. Code	**KOKKM223**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**0 practice**	**2 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	15 hours	**Homework**	34 hours
Reading written materials	20 hours	**Midterm preparation**	15 hours	**Exam preparation**	10 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Csiszár Csaba
12. Lecturers	Dr. Csiszár Csaba, Dr. Csonka Bálint, Dr. Földes Dávid

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Modeling basic processes and information systems of the transportation operations. Structural and functional models. Informatics structure of transportation organizations. Summarization of conditions and opportunities of integration. Introduction and classification of analysis and modelling methods. Mobility services based on autonomous vehicles.

15. Description of practices

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16. Description of laboratory practices

System planning rudiments. Case studies. The students elaborate a complex topic regarding modelling and planning of an information system for transport operation.

17. Learning outcomes

a) knowledge: The students know structure and operation of complex transportation information systems. b) skills: They are able to analyse and design transportation information systems and operational processes. c) attutude: The students strive for precise and errorless task accomplishment. d) autonomy and responsibility: They apply the knowledge with responsibility; they are able to work independently or in a team according to the situation.

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

The students write 2 midterms and submit 1 student assignment. The mid-semester signature is obtained if all the midterms are passed (half of the maximal scores) and the student assignment is submitted and accepted (at least half of the maximal scores). The semester is finished by oral exam. The final mark contains the mid-semester performance in 30%.

19. Opportunity for repeat/retake and delayed completion

The midterms can be retaken according to Code of Studies. The student assignment can be submitted after deadline (if extra fee is paid).

20. Learning materials

ppt slides, Csaba Csiszár – Bálint Csonka – Dávid Földes: Innovative Passenger Transportation Systems (book), Dr. Csiszár Csaba – Caesar Bálint – Csonka Bálint – Földes Dávid: Transportation Information Systems I. Study-aid for practices in computer laboratory (2016)

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport Infrastructure Management**				
2. Subject name in Hungarian	Közlekedési infrastruktúra menedzsment			**3. Role**	
4. Code	**KOKKM228**	**5. Evaluation type**	**m**	**6. Credits**	**3**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	12 hours
Reading written materials	34 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mészáros Ferenc
12. Lecturers	Dr. Mészáros Ferenc

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Transport infrastructure and corridor policy of the EU and Hungary, network development strategies and transport policy. Techniques for asset valuation and registration of transport infrastructure. Infrastructure operation and maintenance strategies, adaptation to climate change. Types of operation contracts, risk management techniques. Asset management methods in practice. Case studies related to transport infrastructure management.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: the student is familiar with the infrastructure and corridor policy of the EU and Hungary, and the methods that can be used for the evaluation and efficient management of infrastructure. The student knows the climate challenges of the transport infrastructure.

b) skills: the student is able to select an effective solution for infrastructure management and evaluate its results and impacts.

c) attitude: the student strives for completeness in the acquisition of knowledge, co-operates with the teacher and other students, is open to new and innovative ideas, researches, and uses information technology and computing tools for its work.

d) autonomy and responsibility: the student makes responsible decisions on the efficient management of the infrastructure, asks for the professional opinions of others, and takes care of the challenges responsibly.

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

Requirements: successful completion (min. 50%) of the two midterms, report and submission of the seminar report. Weights of requirements in the mid-term grade: seminar reporting activity (15%), two midterms' average (85%).

19. Opportunity for repeat/retake and delayed completion

There are retakes from 1st and 2nd midterms, the written report can be delayed completed till end of delayed completion period.

20. Learning materials

Related national and international scientific literature

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport modelling**				
2. Subject name in Hungarian	Forgalmi modellezés			**3. Role**	
4. Code	**KOKKM229**	**5. Evaluation type**	**e**	**6. Credits**	**6**
7. Weekly contact hours	**1 lecture**	**0 practice**	**3 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	56 hours	**Preparation for seminars**	30 hours	**Homework**	30 hours
Reading written materials	24 hours	**Midterm preparation**	20 hours	**Exam preparation**	20 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Tóth János
12. Lecturers	Aba Attila

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Basics of transport modelling. Process of transport network planning and application in VISUM szoftver. Traffic assignment models and their parameters. Network model, demand modell, impact model. Methods of traffic assignment in private and public transport. The theory of applied softwares. Microscopic modelling with VISSIM software. Traffic analyzing in a junction model.

15. Description of practices

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16. Description of laboratory practices

In the framework of individual work a VISSIM and VISUM modelling tasks are prepared.

17. Learning outcomes

a) knowledge: Familiar with the basics of micro and macro modelling. b) skills: Able to use the softwares and apply modelling methodologies. c) attitude: Attempts to routinely use modelling technics. d) autonomy and responsibility: Use softwares independently and responsibly

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

Signature: 2 homeworks (VISSIM and VISUM), 2 presentation about homeworks. Written exam, final grade is the average of the results of homeworks (separately) and the written exam result.

19. Opportunity for repeat/retake and delayed completion

Both midterm test correction possibility and possibility of delayed deadline for home work.

20. Learning materials

Presentation slides, manual of softwares.

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Transport operation**				
2. Subject name in Hungarian	Közlekedés üzemtan			**3. Role**	
4. Code	**KOKUM206**	**5. Evaluation type**	**e**	**6. Credits**	**5**
7. Weekly contact hours	**2 lecture**	**2 practice**	**0 lab**	**8. Curriculum**	**K**

9. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for seminars**	12 hours	**Homework**	27 hours
Reading written materials	29 hours	**Midterm preparation**	6 hours	**Exam preparation**	20 hours

10. Department	Department of Transport Technology and Economics
11. Responsible lecturer	Dr. Mándoki Péter
12. Lecturers	Dr. Mándoki Péter, Kózel Miklós, Soltész Tamás, Aba Attila, Dr. Lakatos András

13. Prerequisites	Transport Economics (KOKGM201), advised; Decision making methods (KOKKM221), advised; - (-), -

14. Description of lectures

Process of planning transport establishment using methodological guides. Structure and Chapters of Feasibility Study and Preliminary Feasibility Study. Fit to the policy, evaluation of projects. Development of project variants, evaluation of variables and variations. Planning principles for bus stations, railway stations, airports. The concept of intermodality, the design and function of intermodal nodes. Establishing transfer links. Principles and aspects of universal design.

15. Description of practices

International and domestic, positive and negative examples of intermodal nodes. Consultation related to the design task.

16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: The student knows and understands the characteristics, fields of application and planning techniques of each transport sub-sector. b) skills: Ability to dealing with creative problems in the field of transport and flexible solutions to complex tasks. Able to plan an intermodal node, taking into account their operational aspects. Able to working in a group, sharing tasks and managing them over time. c) attitude: engages in professional and ethical values related to the technical field, and works based on a system-oriented and process-oriented mindset, in a team-work. d) autonomy and responsibility: Make his decisions carefully, in consultation with representatives of other fields of expertise, with full responsibility. n the case of team work, he also works with a well-defined responsibility

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

Writing a midterm test, which accounts for 10% of the final mark. Preparation of a semester design task (intermodal nodal design), in team-work, which accounts for 90% of the final mark. The oral exam of this subject consists of presenting the design task.

19. Opportunity for repeat/retake and delayed completion

Unsuccessful test can be replaced two times during the replacement period. It is also possible to complete or supplement the desing task until the end of the replacement week.

20. Learning materials

The presentation slides. The methodological guide. The planning manual

List of offered elective economics courses

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Argumentation, Negotiation and Persuasion**				
2. Subject name in Hungarian	Érvelés, tárgyalás, meggyőzés			**3. Role**	kv
4. Code	**GT41MS01**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

10. Department	Department of Philosophy and History of Science
11. Responsible lecturer	Dr. Láng Benedek István
12. Lecturers	Szabó Krisztina

13. Prerequisites	- (-), -

14. Description of lectures

During the course of Argumentation, Negotiation,Persusion, students can acquire the basic theoretical and practical knowledge of all three subjects. In the persuasion-technical block we examine the techniques, psychological assumptions and social significance of manipulation, influence and persuasion. The lessons will be about rational decision-making processes, inter-group conflicts, norm-tracking and group thinking from the point of view of social psychology. Students will become familiar with the concepts of dissonance theories, perception, remembrance, framing, social categorization and attitude change through everyday examples and case studies, so they will be able to recognize and correctly interpret the relevant processes of the media and advertising industry. During the argumentation technique we discuss the peculiarities of the various types of disputes, especially the rational discussion. Students can develop their reasoning, discussion, and lecture skills by analyzing real-world dialogues, video details and personal examples, using the toolbox of logic to be able to stand their place in both the argument and rhetoric of work and private life. In negotiation techniques, we discuss the basic types and strategies of negotiation, the pitfalls of negotiating situations, and the proposed ways of avoiding them. During the lessons, the theory is put into practice through case studies and small group exercises, simulating real negotiating situations, where students can sharply" test, improve their negotiating skills, and thus prepare for the challenges of the labor market. "

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: - Knows the widely used problem-solving techniques for research or scientific work. - Knows the management tools and methods related to management, and the legislation needed to practice the profession.

b) skills: - Being able to design and manage the use of technical, economic, environmental, and human resources.

c) attitude: - Being open and responsive to the knowledge and acceptance of professional, technological development and innovation in the field, and to the provision of authentic mediation. - Seeks to adhere to and adhere to the ethical principles of work and organizational culture, and to compliance with quality requirements.

d) autonomy and responsibility: - Takes decisions carefully, in consultation with representatives of other fields of expertise (primarily legal, economic, energy and environmental), with full responsibility. - Being responsible for sustainability, health and environmental awareness. - Decisions take into account the principles and principles of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulations, and engineering.

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

To complete the course, 2 midterm tests must be written during the semester. Type of midterms: multiple choice test and essay. 1st midterm: max. 40 points available. 2nd midterm: max. 60 points available. So a total of 100 points can be collected from the two midterms.

Student can earn extra points for midterm scores as follows:

Visiting lectures is not a must, there is no catalog, but anyone who enters and enriches the lesson with the sessions of the curriculum has an extra point, which is recorded at the end of each hour. It is important that students have to come and write down their points after every hour. You cannot enter a point backwards. If students send links, advertisements, a few paragraph analyzes, etc. to the curriculum, we can also reward them with extra points. Plus points can be earned no later than the last hour, then no longer.

19. Opportunity for repeat/retake and delayed completion

Up to one of the 2 midterm tests can be replaced or improved during the delayed completion period.

20. Learning materials

https://www.filozofia.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Economic Analysis of Technological Processes**				
2. Subject name in Hungarian	Műszaki folyamatok közgazdasági elemzése			**3. Role**	kv
4. Code	**GT30MS02**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	0 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Economics
11. Responsible lecturer	Dr. Major Iván
12. Lecturers	Dr. Vigh László

13. Prerequisites	- (-), -

14. Description of lectures

In everyday practice - unfortunately - a technical and economic solution to a problem they are looking separately, in extreme cases, the experts of the two areas do not understand each other's language. The object In this context, we are trying to link these two disciplines, primarily from the economic point of view. In doing so, several technical processes (production, innovation, raw material management (costs), etc.) from an economic point of view, we show the relevant economic aspects. In addition, we examine the market environment of companies, which has a decisive impact on product sales and revenue. Our goal is for future engineers to recognize the economic elements of their activities, which will certainly make the acceptance of their products easier.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge: - Knows the role of the production process, the cost of technology, - knows the benefits of capacity utilization and economies of scale - knows the market environment of companies and its impact on production and sales activities, - knows the relationship between technology and market structures, - knows the potential and benefits of technological innovation, innovation in the markets.

b) skills: - Ability to design, organize and conduct independent learning, - is able to apply the general and specific economics principles, rules, relationships, procedures in solving problems in the technical field; - is capable of complex planning and management of the use of technical and economic resources, - is able to identify the external market environment and its changes, - is able to analyze and evaluate market opportunities, - is able to theoretically base economic decisions.

c) attitude: - Collaborates with the instructor and student fellows to expand knowledge - expands your knowledge through continuous knowledge - open to the use of information technology tools, - seek to understand the economic tools needed to solve technical problems, - strives for accurate and error-free task solving.

d) autonomy and responsibility: - Openly accepts well-founded critical remarks, - independently performs the analysis of economic problems, the evaluation of related tools, - openly accept well-founded critical remarks, - uses his systemic approach in his thinking.

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

Learning outcomes are assessed on the basis of two mid-term tests: a complex, written assessment of knowledge, skills, attitudes, and independence and responsibility types of the subject in the form of midterm tests. The tests are on the one hand test questions, which are the interpretation of certain concepts and the connection between them, as well as the calculation tasks, which examine the problem-solving-ability. The topic of tests is determined by the lecturer, the available working time is 45 minutes/test. A prerequisite for obtaining a midterm grade is that the student does not have to make a replacement in the case of half of the midterm tests (i.e. one student has to reach at least 40% from one midterm test). If the student does not participate in any of the midterm tests, the course will be assessed as "Not fulfilled" (based on Code of Studies). 50-50% of the results of the two midterm test scores are counted in the final grade.

19. Opportunity for repeat/retake and delayed completion

Midterm tests can be replaced once during the term. In the delayed completion period, according to the Code of Studies, the midterm tests may be supplemented by the paying a delayed completion fee.

20. Learning materials

http://kgt.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Investments**				
2. Subject name in Hungarian	Befektetések			**3. Role**	kv
4. Code	**GT35M004**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

10. Department	Department of Finance
11. Responsible lecturer	Dr. Bethlendi András
12. Lecturers	Póra András

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The main objective of the course is to familiarize students with: the operation of stock markets, stock exchanges, institutions and indexes on the market, the basic theoretical background of stock analysis, its main methods, and the main portfolio management strategies. During the semester, emphasis will be placed on the methodology of fundamental stock analysis.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge

- Knows the widely used problem-solving techniques for research or scientific work.
- Knows the management tools and methods related to management, and the legislation needed to practice the profession.

b) skills

- Being able to design and manage the use of technical, economic, environmental, and human resources.

c) attitude

- Being open and responsive to the knowledge and acceptance of professional, technological development and innovation in the field, and to the provision of authentic mediation.
- Seeks to adhere to and adhere to the ethical principles of work and organizational culture, and to compliance with quality requirements.

d) autonomy and responsibility

- Takes decisions carefully, in consultation with representatives of other fields of expertise (primarily legal, economic, energy and environmental), with full responsibility.
- Being responsible for sustainability, health and environmental awareness.
- Decisions take into account the principles and principles of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulations, and engineering.

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

1st midterm test from the first quarter. 2nd midterm test from the second quarter.

All midterm test are 45 minutes long for 50 points; Multiple choice tests and calculation tasks.

19. Opportunity for repeat/retake and delayed completion

Both midterm test can be rewritten by once.

20. Learning materials

http://www.finance.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Leadership and Applied Management Psychology**				
2. Subject name in Hungarian	Alkalmazott vezetéspszichológia			**3. Role**	kv
4. Code	**GT52MS01**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	0 hours	**Homework**	32 hours
Reading written materials	0 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

10. Department	Department of Ergonomics and Psychology
11. Responsible lecturer	Dr. Répáczki Rita
12. Lecturers	Dr. Hámornik Balázs Péter

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

The aim of the subject is to develop practical skills in addition to the theoretical knowledge of leadership psychology. Within this, the issues of the process of managerial maturity, the managerial personality, the role and the role are also elaborated. The aim is also to develop practical skills, the importance of which is important for effective leadership.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge

- Knows the widely used problem-solving techniques for research or scientific work.
- Knows the management tools and methods related to management, and the legislation needed to practice the profession.

b) skills

- Being able to design and manage the use of technical, economic, environmental, and human resources.

c) attitude

- Being open and responsive to the knowledge and acceptance of professional, technological development and innovation in the field, and to the provision of authentic mediation.
- Seeks to adhere to and adhere to the ethical principles of work and organizational culture, and to compliance with quality requirements.

d) autonomy and responsibility

- Takes decisions carefully, in consultation with representatives of other fields of expertise (primarily legal, economic, energy and environmental), with full responsibility.
- Being responsible for sustainability, health and environmental awareness.
- Decisions take into account the principles and principles of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulations, and engineering.

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

Participation in 70% of the lessons, preparation of two individual reports.

19. Opportunity for repeat/retake and delayed completion

According to Code of Studies

20. Learning materials

http://www.erg.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Managerial Accounting**				
2. Subject name in Hungarian	Vezetői számvitel			**3. Role**	kv
4. Code	**GT35M005**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	0 hours	**Homework**	12 hours
Reading written materials	0 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

10. Department	Department of Finance
11. Responsible lecturer	Dr. Böcskei Elvira
12. Lecturers	Dr. Böcskei Elvira

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Systematic, practice-oriented acquisition of close and contact topics in managerial accounting from theoretical and methodological knowledge of traditional cost management and responsible management accounting to new approaches.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge

- Knows the widely used problem-solving techniques for research or scientific work.
- Knows the management tools and methods related to management, and the legislation needed to practice the profession.

b) skills

- Being able to design and manage the use of technical, economic, environmental, and human resources.

c) attitude

- Being open and responsive to the knowledge and acceptance of professional, technological development and innovation in the field, and to the provision of authentic mediation.
- Seeks to adhere to and adhere to the ethical principles of work and organizational culture, and to compliance with quality requirements.

d) autonomy and responsibility

- Takes decisions carefully, in consultation with representatives of other fields of expertise (primarily legal, economic, energy and environmental), with full responsibility.
- Being responsible for sustainability, health and environmental awareness.
- Decisions take into account the principles and principles of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulations, and engineering.

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

Semester tasks:

1. A midterm grade can be obtained with a substantial mid-term job, which means that students will attend 70% of the lecture, and the lesson tasks received at the moodle will be solved on the day of the lecture, no later than midnight. (The hourly tasks allow you to reach 15 * 4 = 60 points, this is already sufficient. You can upload individual and group standalone tasks in the moodle until the deadline for each task. (You can also get 60 points for independent tasks that can be added in full. for points earned from hourly work if it reaches or exceeds 40 points The marks of the semester's performance that can be assessed in this way will be added to Neptune by end of last but one week and students will be exempt from writing in their home.

2. If during the semester you are unable or unwilling to obtain the task in the manner described in point 1, you can complete the subject with a successful solution of at least 50% on a midterm test what is located on the moodle interface. In this case, a midterm grade can be improved by one grade from the acquired intermediate points.

19. Opportunity for repeat/retake and delayed completion

The midterm can be rewritten once.

20. Learning materials

http://www.finance.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Quality Management**				
2. Subject name in Hungarian	Minőségmenedzsment			**3. Role**	kv
4. Code	**GT20M002**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	12 hours
Reading written materials	0 hours	**Midterm preparation**	16 hours	**Exam preparation**	0 hours

10. Department	Department of Management and Corporate Economics
11. Responsible lecturer	Dr. Kövesi János
12. Lecturers	Dr. Topár József, Erdei János

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Within the framework of the subject, students will become familiar with current issues and methods of developing quality management systems. They get an overview of the quality philosophies applied in the production sectors and the basics of quality management methods that support their implementation.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge

- Knows the widely used problem-solving techniques for research or scientific work.
- Knows the management tools and methods related to management, and the legislation needed to practice the profession.

b) skills

- Being able to design and manage the use of technical, economic, environmental, and human resources.

c) attitude

- Being open and responsive to the knowledge and acceptance of professional, technological development and innovation in the field, and to the provision of authentic mediation.
- Seeks to adhere to and adhere to the ethical principles of work and organizational culture, and to compliance with quality requirements.

d) autonomy and responsibility

- Takes decisions carefully, in consultation with representatives of other fields of expertise (primarily legal, economic, energy and environmental), with full responsibility.
- Being responsible for sustainability, health and environmental awareness.
- Decisions take into account the principles and principles of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulations, and engineering.

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

The subject ends with a mid-term grade. 80% of the grade will be determined by the results of the midterm tests held in the semester and 20% by the group or individual task result. Information about the task will be published on the presentations and on the briefings available on the website. The task is mandatory. Without this, the requirements of the subject cannot be met. The task must be submitted electronically (by e-mail) by the deadline set by the lecturer. Midterm test are 50-50 point each, task is with a maximum of 20 points. Criteria: a minimum of 45 points from the two midterms and a minimum of 18 points on each midterm test, submission of the task. Final grade: sum of midterm scores * 0.8 + task score.

19. Opportunity for repeat/retake and delayed completion

Midterms can be rewritten during the delayed completion period in accordance with the regulations of Code of Studies. There is no possibility to delayed complete the semester task.

20. Learning materials

http://mvt.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Social and Visual Communication**				
2. Subject name in Hungarian	Társadalmi és vizuális kommunikáció			**3. Role**	kv
4. Code	**GT43MS02**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	8 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

10. Department	Department of Sociology and Communication
11. Responsible lecturer	Dr. Bárány Tibor
12. Lecturers	Dr. Szabó Levente

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

It is impossible to communicate! And it is impossible to communicate… The general and social framework of communication. What is communication? Possible definitions, concepts. Disaster images. Representations in the media. Communication as an exchange of information. The information that is unlikely ... And the disorder that increases the information? Shannon's model. Communication as reporting property. Information you didn't want to inform? Communicative pictures? Barnlund's model. Communication as interaction. The group is above all… Illusion that consensus is emerging? Newcomb's model. Communication as participation. The ingenious stupid ants. Participation in incomprehensible group communication. Horányi's theory. Communicated. The user of the device is communicating, revolutionizing the pegasus and arbitrary symbols. Code and social systems. Politics, science, economy, art speak different languages? The institutional reality. When money is not in the tree. Image theory, perception theory. Why is the image effective? What are visual illusions about? The formation of writing. From pictorial representation to no-show signs. The agents of social communication. Rational roles and irrational individuality? A summary of social communication.

15. Description of practices

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16. Description of laboratory practices

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17. Learning outcomes

a) knowledge

- He / she knows all the important elements of the concept of social science, understands the relationships that underlie the scientific interpretation of society and social communication.
- You know and understand the operating mechanisms of social phenomena and subsystems studied by communication and media science.

b) skills

- Is able to compare the basic theories and concepts of social communication, to elaborate rational arguments, ie to form opinions and defend their opinions during the various stages of communication.
- In the field of communication and media research, it is able to make realistic value judgments based on the processed information and to formulate independent proposals based on the conclusions drawn from them.

c) attitude

- It accepts that cultural phenomena are historically and socially defined and variable.
- Consciously represents the methods he uses in his own profession and accepts the different methodological features of other disciplines.
- Open to all forms of professional innovation, inclusive, but not mindful of theoretical, practical and methodological innovations.

d) autonomy and responsibility

- It displays its views as a sovereign player in professional and social forums, and represents its profession, organization and professional team responsibly.

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

Two midterm tests must be written (with at least pass (2) assessments) in the course of the study period, and all of the processed texts can be downloaded on the website of the course. The curriculum processed at each lecture will appear separately on the website of the course after the given lecture (so the obligatory readings for the given midterm test will be gathered here).

Points for each midterm test can be increased by 1-1, 3-3, by answering the question in hours (1st midterm can be increased by one of the 3 hours prior to 1st midterm, the 2nd midterm can be increased by one of the 3 between 1st and 2nd midterm) with an hourly response).

Individual performance with a thesis: discussed in individual consultations. This option is for those who want to deal with some of the topics in addition to the opportunities provided by the lessons, they need extra performance (eg I would like to present my thesis at a Scientific Student Conference (TDK)). Conditions: until the time of the first midterm, the choice of this alternative must be agreed with the instructor, a sketch of the ideas must be prepared, and the possibility of writing the thesis should be discussed in a personal consultation. After that, at least two times the subject has to be consulted on the process, the progress of the text, and at the end of the semester the completed thesis will be discussed, evaluated and, if necessary, additional opportunities beyond the semester will be assessed (eg participation in TDK). The thesis must be submitted by the specified date. Visiting the lessons: according to Code of Studies.

The components of the semester grade are: 1st midterm 50% and 2nd midterm 50%.

19. Opportunity for repeat/retake and delayed completion

The condition for participating in the supplementary midterm test is to fulfill the 1st midterm test (with a minimum of pass (2) result).
Replacement options: 2 (see Semester Scheduled Program)
Both midterms are rewritable for the purpose of increasing the mark, and the final mark takes the best results.
The results can be viewed on the course website and discussed at the weekly consultation time or by email consultation.

20. Learning materials

https://szoc.bme.hu/

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Technology Management**				
2. Subject name in Hungarian	Technológiamenedzsment			**3. Role**	kv
4. Code	**GT20M005**	**5. Evaluation type**	**m**	**6. Credits**	**2**
7. Weekly contact hours	**2 lecture**	**0 practice**	**0 lab**	**8. Curriculum**	**JKL**

9. Working hours for fulfilling the requirements of the subject					**60 hours**
Contact hours	28 hours	**Preparation for seminars**	4 hours	**Homework**	0 hours
Reading written materials	12 hours	**Midterm preparation**	16 hours	**Exam preparation**	0 hours

10. Department	Department of Management and Corporate Economics
11. Responsible lecturer	Dr. Pataki Béla
12. Lecturers	Dr. Pataki Béla

13. Prerequisites	- (-), -; - (-), -; - (-), -

14. Description of lectures

Course objectives:
- highlight the fundamental importance of technology for the successful operation of the organization;
- to promote a deeper understanding of the competitive nature of technology;
- introduce some of the best practices in technology management.

15. Description of practices

-

16. Description of laboratory practices

-

17. Learning outcomes

a) knowledge
- You will be aware of the competitive nature of technology.
- Understand the role of technology and engineering in the success of organizations.
- You will know some of the best practices in technology management.

b) skills
- Will be able to carry out his engineering tasks taking into account business, economic and management aspects.
- Being in a technology area with a lower level managerial position will be able to perform basic engineering manager tasks.

c) attitude
- He strives to put his engineering skills into a business, economic, and management context.
- Responsive to innovation, constant monitoring of technical progress, active participation in development.

d) autonomy and responsibility
- He can make his decisions carefully, in consultation with representatives of other disciplines.

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

To complete the subject, students need to write two, 30-minute long, max. 50-50-point midterm tests. The midterm grade is the total score available for the two midterm tests. There is no score limit to be met in any midterm tests.

19. Opportunity for repeat/retake and delayed completion

Each midterm tests can be written immediately after each other.

20. Learning materials

http://mvt.bme.hu/