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

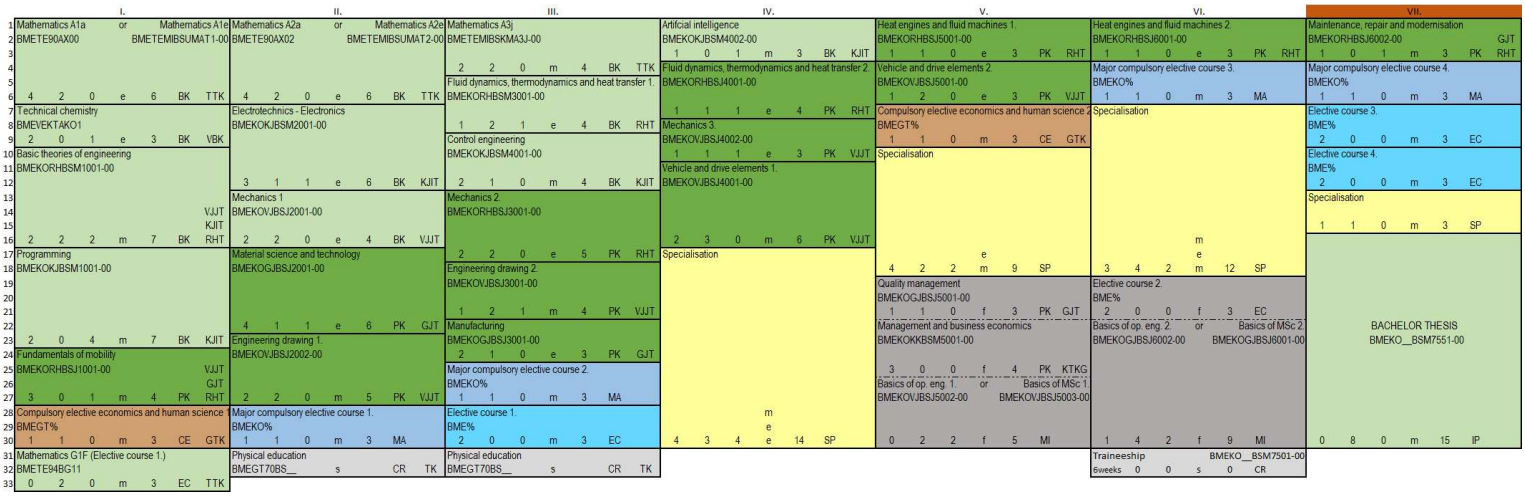
Vehicle Engineering Bachelor Programme

Recommended curriculum and subject descriptions

Valid from September 2025

Code:
6NAAJ_alap

Recommended curriculum of the Vehicle Engineering Bachelor Programme



BK	basic knowledge
PK / IP	professional knowledge / independent project
MA	major compulsory elective course
CE	compulsory elective economics and human science (BMEGT%) or natural science (BMETE%) course
EC	elective course
SP	specialisation
MI	minor compulsory elective course
CR	criteria requirement
	term for student mobility

Specialisations

Automotive specialisation

Automotive engines 1.	BMEKOGJBSJ4A01-00	2	2	2	e	7	SP	GJT
Fundamentals of vehicle dynamics	BMEKOGJBSJ4A03-00	1	0	2	m	4	SP	GJT
Automotive structure and design	BMEKOGJBSJ4A02-00	1	1	0	m	3	SP	GJT
Automotive engines 2.	BMEKOGJBSJ5A02-00	1	1	0	e	3	SP	GJT
Automotive drivelines and vehicle subsystems	BMEKOGJBSJ5A01-00	3	1	2	m	6	SP	GJT
Vehicle operation	BMEKOGJBSJ6A03-00	1	1	1	m	4	SP	GJT
Automotive electronics	BMEKOGJBSJ6A02-00	1	2	0	m	4	SP	GJT
Noise, vibration and harshness	BMEKOGJBSJ6A01-00	1	1	1	m	4	SP	GJT
Professional networking	BMEKOGJBSJ7A01-00	1	1	0	m	3	SP	GJT

Vehicle mechatronics specialisation

Vehicle on-board systems 1.	BMEKOKJBSJ4C03-00	1	2	1	e	5	SP	KJIT
Sensors and actuators	BMEKOKJBSJ4C01-00	1	1	2	m	5	SP	KJIT
On-board vehicle communication	BMEKOKJBSJ4C02-00	2	0	1	m	4	SP	KJIT
Vehicle on-board systems 2.	BMEKOKJBSJ5C01-00	2	1	2	e	5	SP	KJIT
Vehicle control 1.	BMEKOKJBSJ5C02-00	2	1	0	m	4	SP	KJIT
Mechatronics of mobile machinery	BMEKOKJBSJ6C03-00	1	1	2	m	5	SP	KJIT
Machine learning	BMEKOKJBSJ6C01-00	0	2	0	m	3	SP	KJIT
Vehicle control 2.	BMEKOKJBSJ6C02-00	2	1	0	e	4	SP	KJIT
Reliability and safety	BMEKOKJBSJ7C01-00	1	1	0	m	3	SP	KJIT

Ships specialisation

Basic ship theory	BMEKORHBSJ4G02-00	2	2	3	e	8	SP	RHT
Resistance of ships	BMEKORHBSJ4G01-00	1	1	1	e	3	SP	RHT
Operation of ships	BMEKORHBSJ4G03-00	1	0	0	m	3	SP	RHT
Propulsion of ships	BMEKORHBSJ5G02-00	2	1	1	e	5	SP	RHT
Ship machinery	BMEKORHBSJ5G01-00	2	1	1	m	4	SP	RHT
Pleasure craft	BMEKORHBSJ6G03-00	1	1	1	e	4	SP	RHT
Ship construction	BMEKORHBSJ6G01-00	1	2	0	m	4	SP	RHT
Ship structures	BMEKORHBSJ6G02-00	1	1	1	m	4	SP	RHT
Ship electronics systems	BMEKORHBSJ7G01-00	1	1	0	m	3	SP	RHT

Vehicle manufacturing specialisation

Materials of vehicles	BMEKOGJBSJ4D01-00	2	2	1	m	6	SP	GJT
Vehicle manufacturing processes 1.	BMEKOGJBSJ4D02-00	2	2	2	e	8	SP	GJT
Vehicle manufacturing processes 2.	BMEKOGJBSJ5D01-00	2	2	2	e	6	SP	GJT
Quality improvement methods in the automotive industry	BMEKOGJBSJ5D02-00	2	0	0	m	3	SP	GJT
Manufacturing automation and digitalization	BMEKOGJBSJ6D01-00	2	2	2	e	9	SP	GJT
Technological diagnostics	BMEKOGJBSJ6D02-00	1	2	0	m	3	SP	GJT
Automotive assembly technology	BMEKOGJBSJ7D01-00	1	1	0	m	3	SP	GJT

Railway vehicles specialisation

Railway vehicle structures 1. BMEKOVJBSJ4F01-00	2	2	1	e	6	SP	VJJT
Electric motive trains BMEKOVJBSJ4F02-00	2	1	3	e	8	SP	VJJT
Railway vehicle structures 2. BMEKOVJBSJ5F02-00	2	1	1	m	5	SP	VJJT
Diesel motion power BMEKOVJBSJ5F01-00	2	1	1	e	4	SP	VJJT
Maintenance and reparation of railway vehicles BMEKOVJBSJ6F02-00	1	1	1	e	4	SP	VJJT
Operation and diagnostics of railway vehicles BMEKOVJBSJ6F03-00	1	1	0	m	3	SP	VJJT
Modern locomotives BMEKOVJBSJ6F01-00	1	2	1	m	5	SP	VJJT
Railway vehicle mechatronics BMEKOVJBSJ7F01-00	1	1	0	m	3	SP	VJJT

Aircrafts specialisation

Aerodinamics BMEKORHBSJ4B01-00	1	1	1	m	4	SP	RHT
Aviation ecosystem BMEKORHBSJ4B02-00	1	0	2	e	4	SP	RHT
Propulsion and aircraft engines BMEKORHBSJ4B03-00	2	1	2	e	6	SP	RHT
Flight mechanics and aero structures BMEKORHBSJ5B01-00	2	2	1	e	6	SP	RHT
Aircraft maintenance and documentation BMEKORHBSJ5B02-00	2	0	1	m	3	SP	RHT
Greening and flight safety BMEKORHBSJ6B01-00	1	1	0	m	3	SP	RHT
Aircraft systems and avionics BMEKORHBSJ6B02-00	2	3	2	e	9	SP	RHT
Aircraft design and manufacturing BMEKORHBSJ7B01-00	1	1	0	m	3	SP	RHT

Curriculum Supplement
(extracted from the study programme)

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 Bachelor thesis and the final examination**, as well as the order of the final examination.

1) The subject prerequisite system expresses the connections between the subjects. The specific subject prerequisites are included in the subject datasheets. This study programme has a so called **indicative prerequisite system**, that means – except in few cases at subjects from other faculties – there are only recommended prerequisites, with the following amendments:

The *recommended core prerequisite* points out a strong correlation with the learning outcomes of the previous subject, so that without meeting the preprequisite, registration for the subject is possible but professionally contraindicated. The *recommended coherent prerequisite* refers to the link between the learning outcomes of the subjects concerned, i.e. it is recommended that the subject is taken after or in parallel with the previous subject. The *recommended complementary prerequisite* reflects a looser link between the subjects, the learning outcomes of the subject can be achieved with some additional time.

2) *The rules for selection of specialisation and modul, and the general conditions of registering for the specialisation subjects:*

The *rule for selection of specialisation*: the completion of compulsory subjects (including the compulsory elective economics and human science subjects, and the major compulsory elective subjects) with collecting minimum of 75 credits.

The additional rule for selecting the *Automotive specialisation*:

Completion of Mathematics A1a (BMETE90AX00) or Mathematics A1e (BMETEMIBSUMAT1-00), Mathematics A2a (BMETE90AX02) or Mathematics A2e (BMETEMIBSUMAT2-00), Mathematics A3j (BMETEMIBSKMA3J-00), Mechanics 1. (BMEKOVJBSJ2001-00), Mechanics 2. (BMEKORHBSJ3001-00), Fluid dynamics, thermodynamics and heat transfer 1. (BMEKORHBSM3001-00), Basic theories of engineering (BMEKORHBSM1001-00), Material science and technology (BMEKOGJBSJ2001-00), Manufacturing (BMEKOGJBSJ3001-00), and the top 35 ranked students based on the GPA in the Autumn term, and furthermore the top 5 ranked students based on the GPA in the Spring term can start the specialisation (if in the last positions the studends have the same GPA, that the studends with more completed credits will be chosen).

Part of the curriculum, the students shall choose between two possible *carrier minor* in the 5th and 6th term:

- industrial (for students with active employee status, without intention for applying for Master studies) or academic practice (for students without active employee status, without intention for applying for Master studies); or
- MSc theory (for students having intetion for applying for Master studies)

and completion of the related minor's subjects or accreditation of related work experiences.

3) *Enrollment rules for the Bachelor thesis subject in all specializations:*

The completion of compulsory and compulsory elective subjects with collecting minimum of 170 credits, including 31 credits from specialisation subjects, and the completion of the 6 week long traineeship.

4) *Advanced level subject:*

In the first two terms of recommended curriculum, besides the Mathematics A1a and Mathematics A2a subjects, for selected students the advanced level Mathematics A1e (BMETEMIBSUMAT1-00) and Mathematics A2e (BMETEMIBSUMAT2-00) subjects are also available. The selection conditions are set by the Faculty of Natural Sciences, Insitute of Mathematics.

5) *Term designated for student mobility:*

A student may participate in student mobility in the term designated for this purpose in the recommended curriculum, provided that the conditions laid down in the Code of Studies are met, and the subjects completed in the framework of the mobility are

recognised as being the subjects due for the semester of the recommended curriculum which the student would have been entitled to take.

6) *Compulsory elective courses, recommended elective courses*

As part of the training programme, students must complete four (= 12 credits in total) major compulsory elective subjects. 6 credits in total from compulsory elective subjects in economic and human sciences (from the Faculty of Economic and Social Sciences), and 12 credits in total elective subjects. The Faculty offers at least sixteen major compulsory elective subjects in the framework of the training programme. The student may choose the subjects at its discretion from among those announced in the current semester. The compulsory elective subjects in economics and human sciences, the major compulsory elective subjects and the elective subjects set out in the curriculum and announced in the current term are available in the study system. The current lists of major compulsory elective subjects and of recommended elective subjects are available on the Faculty website.

7) *Criteria for taking the final examination:*

Completion of all subjects included in the recommended curriculum, including elective subjects (all together at least 210 credits), submitting the Bachelor thesis, and fulfillment of all criterion requirements in the curriculum (two terms of physical education, six weeks of traineeship).

8) *Final examination order:*

The final examination in front of the Final Examination Board consists of defending the Bachelor thesis and passing oral final examinations from three subjects (or subject groups). The final examination subjects (or subject groups) are assigned by the Department responsible for the specialisation. The subjects must be selected partly from the professional subjects, and from the specialisation 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.

Subject description explanation

1. Subject name	official name of the subject
2. Subject name in Hungarian	official name of the subject in Hungarian
3. Programme	related programmes: k – transportation eng., j – vehicle engineering, l – logistics engineering, p – professional pilot
4. Subject code	Neptun code of the subject
5. Term / role	the term and the role (k – compulsory; kv - compulsory elective; sp – specialisation; szv – elective) of subject in the recommended curriculum
6. Credits	credit value of the subject
7. Evaluation type	type of academic performance assessment, e - exam grade; m - mid-term grade; s - signature
8. Nature	nature of teaching
9. Weekly contact hours	number of lessons for students by lecture, practice and lab
10. Language	language of teaching
11. SDG	learning outcomes' contribution to the EU/UN sustainable development goals
12. 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
13. Organisational unit in charge	name of the organisational unit in charge of the subject
14. Subject coordinator and its position	name and position of the subject coordinator
15. Email address	email address of the subject coordinator
16. … organisational unit	name of the organisational unit for the subject coordinator
17. Instructors	name of the subject's instructor(s)
18. Indicative prerequisites	predefined criteria for registering the subject
19. Purpose	subject's role and purpose in the training programme
20. Programme of lectures	detailed content of the lecture course
21. Programme of practices	detailed content of the practice course
22. Programme of laboratories	detailed content of the laboratory course
23. Learning outcomes	results to achieve at the end of the learning process, grouped by competences (lower case), furthermore their link to the training programme's learning outcomes (upper case)
24. Midterm assessments	name and code of assessments in the study period, their share in the final grade, and the evaluated learning outcomes
25. Exams	a name and code of assessments in the exam period, their share in the final grade, and the evaluated learning outcomes
26. Criteria to obtain a signature / midterm grade	criteria that shall be met to obtain the signature / midterm grade from the subject
27. Grading rules	rules of grading in share (%) of the summarised results of assessments
28. Attendance and participation requirements	derogations from the main rule laid down by the Code of Studies
29. Retake and delayed completion	requirements for passing the subject, aspects of performance evaluation, way to determine a grade (obtain a signature)
30. Consultation	consultation oppportunities offered by the instructor(s)
31. Learning materials	notes, textbooks, suggested literature, recommended learning support materials in printed or electronic form
32. Start of validity for the subject decription	start of vailidy for the information laid down by the subject decription

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

Subject description

1. Subject name	**Aerodinamics**				
2. Subject name in Hungarian	Aerodinamika			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4B01-00**			**5. Term | role**	**4 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	20 hours
Reading written materials	30 hours	**Midterm preparation**	18 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Jankovics István assistant lecturer	**15. Email address**	jankovics.istvan@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Archtecture		
17. Instructor(s)	Jankovics István		
18. Indicative prerequisites	BMEKORHBSM3001-00 Hő- és áramlástan 1. recommended core, - - -, - - -		

19. Purpose

The course aims to provide students with a comprehensive overview of aircraft aerodynamics. It introduces the fundamentals of lift generation and the methods of its control across low-speed, subsonic, transonic, and supersonic flight regimes. The course also explores various approaches to describing aerodynamic characteristics and reviews the unique aerodynamic properties of special-purpose aerial vehicles.

20. Programme of lectures

Physics of the Atmosphere. Standard Atmosphere. Basics of fluid dynamics, potential flow, standard flows. Theory of boundary layer, laminar and turbulent boundary layers, flow separatation. Aerodynamics force, lift, drag and aerodynamic moment. Theory of airfoils. Theory of finite wings. Gas dynamics, shockwaves. Characteristics of subsonic, transonic and supersonic flight. Aerodynamics characterisation of aircraft, polar corve. Lift and drag augmentation. Aerodynamic characterisitics of non-conventional aircraft.

21. Programme of practices

Solving and practicing numerical examples

22. Programme of laboratories

Demonstrate measuring and calculating aerodynamic forces and moments, flow visualistaion methods.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the aerodinamics theories described in lectures.

b) skills (k)

1. is able to use the aerodinamics measurement and calculation knowledge described in details at Description of lectures.
2. is able to communicate his thoughts about aerodinamics, ideas clearly through sketches, and exercises.

c) attitude (a)

1. aims to create exact, aesthetic and obvious documentation.
2. is interested, responsive, independent, take care for the deadlines.

d) autonomy and responsibility (o)

1. able to create technical documentation independently.
2. aware of the significance of his work and the consequences of mistakes.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. independent calculation task	1. ZH 1. HF	1. 85% 2. 15%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

submission of homwork on time and successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material. Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Aircraft design and manufacturing**				
2. Subject name in Hungarian	Repülőgépek tervezési lépései és gyártása			**3. Programme**	j
4. Subject code	**BMEKORHBSJ7B01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	15 hours	**Homework**	0 hours
Reading written materials	17 hours	**Midterm preparation**	30 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Veress Árpád, Dr. Rohács József, Jankovics István		
18. Indicative prerequisites	BMEKORHBSJ5B02-00 Repülésmechanika és repülőgépek szerkezete recommended complementary, - - -, - - -		

19. Purpose

Basic aircraft design steps and aircraft production

20. Programme of lectures

The design process; the steps in the aircraft design process: requirements, concept design, preliminary design, detailed design, production and testing. Fundamentals of aeronautical device manufacturing; introduction to main structural materials, manufacturing principles and processes, metallic materials, composite materials and manufacturing processes. Metallic fasteners, composite structure repair, composite structures and bonding methods, emerging additive machining technologies (e.g. 3D printing). Basic measurement and inspection methods.

21. Programme of practices

Learn practical methods for aircraft manufacturing.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the aircraft design and manufacturing technologies, processes, and requirements

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies in aircraft design and manufacturing in a meaningful way
2. is able to communicate the ideas and plans about aircraft technologies clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm tests

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Aircraft maintenance and documentation**				
2. Subject name in Hungarian	Repülőgépek karbantartása és dokumentációi			**3. Programme**	j
4. Subject code	**BMEKORHBSJ5B02-00**			**5. Term | role**	**5 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	15 hours	**Homework**	0 hours
Reading written materials	13 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Pásztor Zoltán, Kanti Dominik Máté, Maresch Norbert		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Collecting basic knowledge of aircraft maintenance specifications
Collecting basic knowledge of aircraft maintenance documentation
(Manufacturer, CAMO, Operator, MRO, Authotity issued documents)

20. Programme of lectures

Intro – Maintenence Documents. Maintenence/Repair Docs (Costumized, Non Costumized, Ad-Hoc). Component Documents. Authority released documents. TC Holder (Aircraft Designer) released documents. Aircraft/Component Identification. Aircraft (Manufacturer) Service Documents. STC Holder released documents. Maintenence Tasks. CAMO released documents. Operator (Ops, Maint) released documents. MRO (ACE) released documents.

21. Programme of practices

-

22. Programme of laboratories

Physical meet with some of the basic documentation learned in the lectures, and mastering their handling at a skill level

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the aircraft maintenance and documentation technologies, processes, and requirements

b) skills (k)

1. can find the way around different documents, interprets the validity of a given document, can identify different documents and concepts based on the abbreviations used in lectures.

c) attitude (a)

1. consider the specific maintenance requirements, needs and limitations of the aircraft being maintained.

d) autonomy and responsibility (o)

1. independently verify the unique identifiers of the aircraft/equipment/component concerned, and consequently determine the required applicable documentation.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 50%	1. t1,k1,a1,o1
2. midterm test	2. ZH2	2. 50%	2. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
successful (min. 50%) completion of the midterm tests	Excellent 88-100% Good 75-87% Satisfactory 63-74% Pass 50-62% Fail 0-49%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
Second retake from both midterm tests.	

30. Consultation
at a time and in a form agreed with the teacher
31. Learning materials
Lecture slides
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Aircraft systems and avionics**				
2. Subject name in Hungarian	Repülőgépek rendszerei és avionika			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6B02-00**			**5. Term | role**	**6 | sp**
6. Credits	**9**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**3 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**270 hours**
Contact hours	98 hours	**Preparation for lessons**	20 hours	**Homework**	30 hours
Reading written materials	62 hours	**Midterm preparation**	30 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Rohács Dániel associate professor	**15. Email address**	rohacs.daniel@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Rohács József, Dr. Óvári Gyula, Rácz János, Hámori György		
18. Indicative prerequisites	BMEKORHBSJ5B02-00 Repülésmechanika és repülőgépek szerkezete recommended complementary, - - -, - - -		

19. Purpose

Gaining basic knowledge on the major aircraft systems and avionics.

To know the function of aircraft systems, the technical basis of their operation, their modern technological implementation, known development perspectives, the advantages of their use, their possible limitations, and the related terminology.

20. Programme of lectures

Aircraft on-board systems: steering control, energy (fuel, hydraulic, pneumatic, electric), passenger and cargo transport, passenger comfort and rescue, flight safety (tempering and air conditioning, fire-fighting, de-icing, emergency), primary and navigation instruments (conventional and electronic), autopilot, altimeter, radar, proximity indicator, flight monitoring systems. Related sensors and controllers and ground server systems.

On-board electrical and avionics systems of aircraft: electrical energy systems (generation, regulation, distribution, short circuit protection, conversion (frequency, voltage), conversion (into mechanical work, heat, cooling, lighting) primary and navigation instruments (conventional and electronic), automatic flight control, radio altimeter, radar, ground proximity warning, flight surveillance, collision avoidance, flight management, data recording systems.

21. Programme of practices

Solving and practicing numerical examples necessary for the acquisition of the theoretical part of the curriculum.

During the practical excercises, students gain insight into the technical implementation of electrical and avionics systems in modern passenger aircraft.

22. Programme of laboratories

Getting to know the mechanical and avionic systems of aircraft (on-board and ground) in practice.

Via video or 3D simulation students are gaining live impression about operation and use of electrical and avionic systems

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the aircraft systems and avionics technologies, processes, and requirements

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies aircraft systems and avionics in a meaningful way
2. is able to communicate the ideas and plans about avionics clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. independent calculation task	1. ZH 1. HF	1. 40% 2. 20%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 40%	1. t1,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

submission of homwork on time and successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

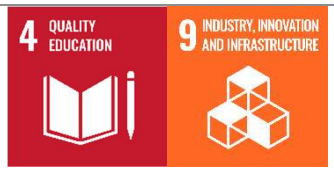
Presentation slides and additional practicing materials

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Artificial intelligence**				
2. Subject name in Hungarian	Mesterséges intelligencia			**3. Programme**	jkl
4. Subject code	**BMEKOKJBSM4002-00**			**5. Term | role**	**4 | k**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	20 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	22 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Bécsi Tamás associate professor	**15. Email address**	becsi.tamas@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Bécsi Tamás		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to familiarize students with the basic principles, technological background and application possibilities of artificial intelligence. Special attention is paid to the ethical dimension of the use of AI, including issues of data protection, responsibility and social impacts. Students analyze and interpret the practical role, benefits and dilemmas of AI through real or realistic case studies.

20. Programme of lectures

The lecture provides an introduction to the history, concepts, basic operating mechanisms of AI, and the basic principles of machine learning. The course material covers various structures of artificial intelligence: rule-based systems, decision trees, classical machine learning models, and then provides a deeper insight into modern deep learning architectures. Students will become familiar with, among others, convolutional neural networks; generative adversarial networks, etc. The comparison of different learning methods – supervised, unsupervised, and reinforcement – is also emphasized. A prominent topic is the presentation of the operation, teaching, and practical application of large language models (LLMs). Students will learn how these models work, what they are capable of, what risks they may pose, and how they can be used consciously in different fields.

The course also addresses the ethical and social aspects of AI: transparency, accountability, data protection, algorithmic biases, and the sustainable and equitable use of artificial intelligence. At the end of the course, students will analyze AI solutions from industry, education, healthcare, and the public sector through real or simulated case studies.

21. Programme of practices

-

22. Programme of laboratories

The aim of the lab activities associated with the course is to give students hands-on experience in developing artificial intelligence-based models. The tasks are carried out in an AI-assisted way, where AI is used as a tool to support model building, coding and debugging. During the exercises, students will be introduced to different learning methods and AI application domains, fostering the development of reflective, problem-solving thinking.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basic concepts of machine learning, the functioning of the "Internet of Things" (IoT), and the role of computer communication and application software in AI systems. (K:T17;J:T17,T21;L:T21)
2. Is aware of the basic principles of the operation of artificial intelligence and its ethical and data protection aspects. (K:T16;L:T20)

b) skills (k)

1. Is able to process structured data, use and design artificial intelligence applications, and effectively search, evaluate and manage digital content. (K:K4,K28,K29,K30,K31;J:K4,K36,K37,K38;L:K4,K31,K32,K33)
2. Is able to communicate, collaborate and interact effectively using digital technologies. (K:K12,K31;J:K12,K39;L:K12,K34)
3. Able to design, operate and test IT systems based on models. (K:K11,K34;J:K11,K42;L:K11,K37)

c) attitude (a)

1. Accepts the professional and ethical responsibility associated with the use of artificial intelligence and actively represents the values of digital rights and democracy. (J,K,L:A1,A2)

2. Continuously develops his/her AI-related knowledge with a reflective, self-critical attitude, is open to changes and technological self-education. (J,K,L:A3,A12)

3. Has a positive attitude towards complex problems related to artificial intelligence, strives for effective, responsible solutions and considers possible alternatives. (J,K,L:A4,A6,A10,A13)

d) autonomy and responsibility (o)

1. Able to take initiative and make decisions independently, from internal motivation, in the design, evaluation or application of artificial intelligence. (J,K,L:O1,O2,O4)

2. Has a critical and responsible attitude towards information related to AI, formulates his/her judgments in a well-founded and autonomous manner. (J,K,L:O5,O6)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 1 2. midterm test 2	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,t2,k2,a3,o1,o2 2. t1,t2,k1,k3,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

To obtain the semester grade, the combined average of Midterm 1 and Midterm 2 must reach at least 50%

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Only one of the mid-semester requirements can be made up through repeated replacement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Automotive assembly technology**				
2. Subject name in Hungarian	Járműipari szereléstechnológia			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ7D01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	0 hours	**Homework**	20 hours
Reading written materials	20 hours	**Midterm preparation**	22 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Varga Ferenc László senior lecturer	**15. Email address**	varga.ferenc.laszlo@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Bán Krisztián, Dr. Hlinka József, Dr. Vehovszky Balázs, Dr. Herczeg Szabolcs, Dr. Markovits Tamás, Dr. Göndöcs Balázs,Dr. Pál Zoltán, Szabados Gergely		
18. Indicative prerequisites	BMEKOGJBSJ5D01-00 Járműgyártás folyamatai 2. recommended core, BMEKOGJBSJ5D02-00 Minőségfejlesztési módszerek a járműiparban recommended complementary, - - -		

19. Purpose

The objective of the course is to provide students with adequate basic knowledge of assembly processes in the automotive industry. This knowledge should offer a sufficient basis for their further studies and engineering work.

20. Programme of lectures

Construction requirements in assembling of conventional, hybrid and electric vehicles. Assembling by accumulative dimensions. Groups of operations and processes in assembling. Process plan and documentation of assembling. Processes and types of equipment of screwed joints, riveting, joining with plastic deformation. Properties and equipment of parts connections applied in the automotive industry. Assembling of shaft-hub-connections. Requirements and equipment of bearing assembling. Operations and equipment of handling technology. Types of equipment of mechanization and automatization in assembling. Structure and operation of assembly units. Common model, types, constructions, operation and control of assembly systems. Assembly systems of the automotive industry. Simulation of assembly processes. Logistic processes and types of equipment for assembly lines. The essence of the supply activity, its quality requirements and the conditions of becoming a supplier.

21. Programme of practices

Construction analysis from the point of view of assembly, riveting, automatic arrangement planning, bearing assembly, process simulation, documentation of assembly technology.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Is familiar with fundamental assembly tools in the automotive industry.

b) skills (k)

1. By applying the knowledge about assembly tools and related professional expertise, is capable of contributing to solving tasks in automotive assembly technology systems.

c) attitude (a)

1. Cooperates with instructors in their studies to develop knowledge of manufacturing systems.

d) autonomy and responsibility (o)

1. Is aware of the responsibility to set an example to your colleagues by the quality of your work and by adhering to ethical standards, applying the knowledge acquired in the subject with responsibility.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. Midterm test 2. Midterm test 3. Planning task	1. ZH1 2. ZH2 3. TF1	1. 25% 2. 25% 3. 50%	1. t1,k1,a1,o1 2. t1,k1,a1,o1 3. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing both midterm test, and approval of the planning task

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

One midterm test can be retaken twice, planning task can be supplemented during the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

Auxiliary materials and ppt's downloadable from the Moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Automotive drivelines and vehicle subsystems**				
2. Subject name in Hungarian	Erőátvitel és jármű rendszerelemek			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ5A01-00**			**5. Term | role**	**5 | sp**
6. Credits	**6**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**3 lecture**	**1 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	16 hours	**Homework**	30 hours
Reading written materials	30 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Harth Péter senior lecturer	**15. Email address**	harth.peter@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Virt Márton, Dr. Harth Péter, Dr. Szabó Bálint, Dr. Lelkes Márk		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to provide an in-depth understanding of vehicle power transmission systems, brake systems, steering systems and automotive suspensions.

20. Programme of lectures

Basic vehicle dynamics calculations. Clutches. Conventional gearbox designs. Automated power transmission systems. Planetary gears. Hydromechanical power transmission systems. Continuously variable transmissions. Differential gears. All wheel drives. Drivetrain joints. Hybrid and electric power transmission systems. Brake dynamics, brake force distribution. Automotive suspension system, characteristics and kinematics. Spring and damping systems. Steering mechanism

21. Programme of practices

Engineering Calculations, dynamical simulations

22. Programme of laboratories

Disassembly and assembly of power transmission devices. Introduction of automotive suspensions, measurement of steering system

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the power transmission systems.
2. knows the brake systems, brake distribution.
3. knows the automotive suspension systems, characteristics, kinematics.
3. knows the steering systems.

b) skills (k)

1. qualifies the power transmission system as a complex vehicle unit, perform calculations, select technologies
2. selects brake system parameters, determine brake force distribution.
3. analyses automotive suspensions, characteritics and kinematics.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.

2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Drivelines midterm test	1. ZH1	1. 25%	1. t1,k1,a1,o1,o2
2. Drivelines homework	2. HF1	2. 25%	2. t1,k1,a2,a3,o1,o2
3. Brake force distribution homework	3. HF2	3. 15%	3. t2,k2,a2,a3,o1,o2
4. Suspension analysis homework	4. HF3	4. 15%	4. t3,k3,a2,a3,o1,o2
5. Suspension and brake system midterm test	5. ZH2	5. 20%	5. t2,t4,k2,a1,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The midterm test is passed if more than 50% of the maximum score is achieved. Attendance at labs during the semester is mandatory and submission of the homework at an acceptable level is required. A successful midterm test, completion of all labs and submission of homeworks with an acceptable grade is required to receive a passing grade.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

One midterm test can be retaken twice, homeworks can be supplemented during the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

Course bulletins available in moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Automotive electronics**				
2. Subject name in Hungarian	Gépjármű elektronika			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6A02-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	30 hours	**Midterm preparation**	38 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Szalay Zsolt associate professor	**15. Email address**	szalay.zsolt@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Tollner Dávid, Dr. Pethő Zsombor		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

The aim of the course is to provide a comprehensive overview of automotive electronics, presenting the theoretical and practical aspects. In addition to acquiring general knowledge, students can start preparing for a possible future job as an automotive research and development engineer.

20. Programme of lectures

The lectures cover the basic operation and structure of automotive electronics systems. After introducing the basics of electronics, the electrical network of vehicles is covered in detail, including power systems and grounding principles. Sensors and their applications in modern vehicles are covered. The role, design and communication of electronic control units (ECUs) using CAN, LIN and other communication systems are discussed. In the power electronics section, the electronics systems for engine control and electric drives are discussed. Finally, the possibilities of diagnostics and data acquisition, which are essential for fault detection and monitoring of vehicle status, are highlighted.

21. Programme of practices

The objective is to give students hands-on experience in the basics of automotive electronics. During basic electronics measurements, students will learn about voltage, current and resistance measurements, as well as basic circuit calculations. In diagnostic exercises, they will perform fault code reading and vehicle status analysis using OBD and UDS protocols. They gain insight into the operation of vehicle communication networks by reading and interpreting CAN bus data. Finally, students will be introduced to high-voltage batteries and learn about the power supply systems of electric vehicles.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basics of vehicle electronics, including electrical networks, sensors, control units (ECUs), communication protocols (CAN, LIN) and power electronics.

2. learns the basic methods of diagnostics, data acquisition and troubleshooting required to understand and improve automotive systems.

b) skills (k)

1. is able to see the vehicle as a complex electronic system, to perform calculations, to select technologies.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.

2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.

3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.

2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 100%	1. t1,t2,k1,a1-a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing the midterm test with at least a pass grade.

27. Grading rules

Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm test can be retaken once.

30. Consultation

Every lecture

31. Learning materials

Slides, lecture notes

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Automotive engines 1.**				
2. Subject name in Hungarian	Gépjármű motorok 1.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ4A01-00**			**5. Term | role**	**4 | sp**
6. Credits	**7**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**210 hours**
Contact hours	84 hours	**Preparation for lessons**	16 hours	**Homework**	20 hours
Reading written materials	30 hours	**Midterm preparation**	30 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Nyerges Ádám senior lecturer	**15. Email address**	nyerges.adam@kjk.bme.hu
16. …organisational unit	Department of Vehicle Technologies		
17. Instructor(s)	Dr. Nyerges Ádám, Dr. Szabados György, Dr. Harth Péter		
18. Indicative prerequisites	BMEKORHBSM3001-00 Hő- és áramlástan 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to provide an in-depth understanding of vehicle's internal combustion engines.

20. Programme of lectures

Internal combustion engine's cycles, construction, fuel systems, combustion processes, fuels, emission, charge exhage systems.

21. Programme of practices

Design of internal combustion engines, emission calculation.

22. Programme of laboratories

Engine assembly, engine dyno measurements with Otto and Diesel engines.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the internal combustion engines on system-level.

b) skills (k)

1. is able to understand the causalities in internal combustion engines.
2. is able to perform preliminary design calculations.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.
2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. mindterm exam	1. ZH	1. 25%	1. t1,k1,k2,a1,o1,o2
2. homework 1	2. HF1	2. 12,5%	2. t1,k1,k2,a2,a3,o1,o2
3. homework 2	3. HF2	3. 12,5%	3. t1,k1,k2,a2,a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. Vizsg1	1. 50%	1. t1,k1,k2

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Passing the midterm test with at least a pass grade, accepted homeworks.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to TVSZ	
29. Retake and delayed completion	
The midter test can be retaken twice, homeworks can be supplemented during the delayed completion week.	

30. Consultation
Every lecture
31. Learning materials
Course bulletins available in moodle.
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Automotive engines 2.**				
2. Subject name in Hungarian	Gépjármű motorok 2.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ5A02-00**			**5. Term | role**	**5 | sp**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	12 hours	**Homework**	0 hours
Reading written materials	10 hours	**Midterm preparation**	20 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Nyerges Ádám senior lecturer	**15. Email address**	nyerges.adam@kjk.bme.hu
16. …organisational unit	Department of Vehicle Technologies		
17. Instructor(s)	Dr. Nyerges Ádám, Dr. Szabados György		
18. Indicative prerequisites	BMEKOGJBSJ4A01-00 Gépjármű motorok 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to provide an in-depth understanding of vehicle's electric and other alternative powertrains.

20. Programme of lectures

Electric drivetrain's construction, rotating electric machines' construction, cooling, modelling, controlling. Power electronics' operation, cooling. Hybrid and fuel cell powertrains. Alternative fuels.

21. Programme of practices

Design and simulation of rotating electric motors.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the alternative drivetrain systems on system-level

b) skills (k)

1. is able to understand the causalities in alternative drivetrains.
2. is able to perform preliminary design calculations.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.
2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 50%	1. t1,k1,k2,a1,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Oral exam	1. Vizsg1	1. 50%	1. t1,k1,k2,a2,a3,o1,o2

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Passing the midterm test with at least a pass grade, accepted homeworks.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to TVSZ	
29. Retake and delayed completion	
The midter test can be retaken twice.	

30. Consultation
Every lecture
31. Learning materials
Course bulletins available in moodle.
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Automotive structure and design**				
2. Subject name in Hungarian	Gépjármű szerkezettan			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ4A02-00**			**5. Term | role**	**4 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	38 hours	**Homework**	0 hours
Reading written materials	24 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Lelkes Márk senior lecturer	**15. Email address**	lelkes.mark@edu.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Virt Márton, Dr. Nyerges Ádám, Dr. Harth Péter, Dr. Szabó Bálint, Tollner Dávid, Dr. Hanula Barna, Dr. Lelkes Márk		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the course is to provide students with a system-level understanding of motor vehicles, as well as to develop their presentation and communication skills.

20. Programme of lectures

Overview of vehicle engines, transmissions, brakes, suspensions, electrical systems, and other vehicle subsystems.

21. Programme of practices

Introduction to vehicle subsystems.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the motor vehicles like systems on system-level

b) skills (k)

1. is able to comprehend the vehicle as a system, and to give individual presentations on its subsystems

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.
2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Maximum twelve 5 minute quiz at end of classes	1. K	1. 100%	1. t1,k1,a1-a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Each quiz is 6 points, half of the maximum possible score must be achieved.	0-<50%: fail (1), 50-<62%: pass (2), 62-<75%: satisfactory (3), 75-<87%: good (4), 87-100%: excellent (5).
28. Attendance and participation requirements	
According to TVSZ	
29. Retake and delayed completion	
Combined verbal replacement of the quizzes is possible.	

30. Consultation
Every lecture
31. Learning materials
Lévai, Z.: Vehicle structure (in Hungarian)
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Aviation ecosystem**				
2. Subject name in Hungarian	Légiközlekedési ökoszisztéma			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4B02-00**			**5. Term | role**	**4 | sp**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	20 hours	**Homework**	24 hours
Reading written materials	10 hours	**Midterm preparation**	0 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Gál István assistant lecturer	**15. Email address**	gal.istvan@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Gál István		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The student who has completed this course will have a comprehensive knowledge of the use of aircrafts in the transport system. The necessary regulations, systems, methods and philosophies.

20. Programme of lectures

The legal environment of air transport, the rule-making process, key national and international organisations and actors. Introduction to airspace and airspace elements, their applications. Air traffic management: definition and description of the different parts. Description of ATC as applied in the current aviation system. The main navigation and communication tools of air transport. Airports: description of the most important airport departments: terminals, aprons, runways, taxiways, electrical systems, lighting, navigation equipment, etc. Airport design principles. Legal basis for airport design. Airline as an economic operator. Scheduling and network planning basics, economics.

21. Programme of practices

-

22. Programme of laboratories

Demonstration of the lecture topics through site visits.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. understand the processes and tasks of the avionics ecosystem
2. understand the sources and methods of further learning in the aviation

b) skills (k)

1. can apply their knowledge to the topics covered in aviation ecosystem
2. be able to communicate ideas and plans about aviation clearly and visually to others
3. use information technology and computer tools in the work

c) attitude (a)

1. aims to create exact, aesthetic and obvious documentation.
2. is interested, responsive, independent, take care for the deadlines.

d) autonomy and responsibility (o)

1. able to create technical documentation independently.
2. aware of the significance of his work and the consequences of mistakes.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. semestrial homework	1. HF	1. 15%	1. t1,t2,k1-k3,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. V	1. 85%	1. t1,t2,k1-k3,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

Requirement for signature of the subject: successful completion of the home work.

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

According to the rules of Study and Examination Regulations.

29. Retake and delayed completion

Second retake or delayed completion is available from the homework.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Basic ship theory**				
2. Subject name in Hungarian	Hajók elmélete			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4G02-00**			**5. Term | role**	**4 | sp**
6. Credits	**8**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**3 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**240 hours**
Contact hours	98 hours	**Preparation for lessons**	28 hours	**Homework**	34 hours
Reading written materials	20 hours	**Midterm preparation**	30 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Simongáti Győző		

18. Indicative prerequisites	BMEKOVJBSJ2001-00 Mechanika 1. recommended core, - - -, - - -

19. Purpose

The aim of the course is to familiarise students with the basic concepts of ship theory and the practice of buoyancy and stability calculations.

20. Programme of lectures

Ship Types. Vessel floatation, determination of buoyancy on a stationary and a moving vessel. Lines drawing, curve of areas. Hydrostatic characteristics of the vessel. Calculation and experimental determination of the center of gravity. Determination of floatation. Free surface effects.

Concept of stability. Stability calculation methods. Cross cuves of stability. Creating a GZ curve. Universal GZ curve. Typical heeling moments on the vessel. The effect of free surface. Dynamical stability. Determination of dynamical stability curve Classification Society Regulations.

21. Programme of practices

22. Programme of laboratories

Computer Lab for learing ship design software. For given main dimensions, create a computer model of a vessel and use the software to prepare the Stability Manual of the vessel.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic physical rules of ship movements.

b) skills (k)

1. is able to reproduce, adapt and interpret the ship movements in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework (making a model and documentation)	1. ZH 2. F1	1. 25% 2. 50%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. V	1. 25%	1. t1

26. Criteria to obtain a signature / midterm grade

submission of assignments on time or on lessons and successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Basic theories of engineering**				
2. Subject name in Hungarian	Mérnöki alapismeretek			**3. Programme**	jkl
4. Subject code	**BMEKORHBSM1001-00**			**5. Term | role**	**1 | k**
6. Credits	**7**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**210 hours**
Contact hours	84 hours	**Preparation for lessons**	30 hours	**Homework**	0 hours
Reading written materials	46 hours	**Midterm preparation**	50 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Szabó Géza, Ferencz Péter, Németh István, Tulipánt Gergő, Szabó András, Dr. Veress Árpád		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the subject is to bring the physical knowledge previously acquired at different educational places to the same level. Learning the engineering way of thinking, problem- and task-solving skills. Carrying out and evaluating simpler measurements. Electronics. Introduction to basic fields of mechanics. Understanding, studying and learning basic problems in thermal and fluid mechanics.

20. Programme of lectures

Kinematics, Dynamics, Statics, Work, energy, power, Vibrations and waves (basic level). Introduction to thermal and fluid dynamics of vehicles. Fundamentals of electricity. Fundamentals of measurement techniques.

21. Programme of practices

After each topic covered in the lecture, we will work together to solve simple but useful computational examples so that you can learn the application step by step - not only in theory, but also in practice.

22. Programme of laboratories

Voltage, resistance, current and power measurement; Area measurement; Friction coefficient measurement; Mechanical performance measurement, Vibration measurement, Volumetric flow measurement, Temperature measurement

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic physical rules of thermal and fluid dynamics, statiscs, streght of structures, vehicle dynamics, electronics (J,K,L:T2,T3,T6,T7)

b) skills (k)

1. is able to reproduce, adapt and interpret the knowledge about thermal and fluid dynamics, statiscs, streght of structures, vehicle dynamics, electronics in a meaningful way (J,K,L,:K10,K13,K14,K17;J:K36,K45;K:K28,K37;L:K31,K40)

2. is able to communicate the ideas and plans about basic theories of engineering clearly and visually to others (J,K,L,:K10,K13,K14,K17;J:K36,K45;K:K28,K37;L:K31,K40)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team (J,K,L:A1-A4,A6,A7,A10-A13)

2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks (J,K,L:A1-A4,A6,A7,A10-A13)

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others (J,K,L:O2-O6)

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified (J,K,L:O2-O6)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test 3. midterm test	1. ZH1 2. ZH2 2. ZH3	1. 34% 2. 33% 3. 33%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

submission and successful acceptance of laboratory reports and successful (min. 50%) completion of the mid term exams

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

All three mid-semester requirements can be made up in the context of a repeated make-up.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

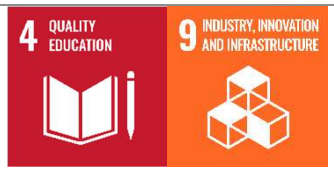
Materials about the lectures, tutorials provided by the professor.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Basics of master studies 1.**				
2. Subject name in Hungarian	MSc alapozás 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ5003-00**			**5. Term | role**	**5 | m**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**0 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	10 hours	**Homework**	30 hours
Reading written materials	34 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Tulipánt Gergely		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

The objective of this course is to lay the foundation for students' MSc-level studies in the field of automotive engineering. Within this framework, it aims to develop students' English for automotive engineering technical language competencies, introduce them to the methodology of scientific research through a research project, and deepen their knowledge of vehicle dynamics.

20. Programme of lectures

-

21. Programme of practices

Introduction to the technical language of automotive engineering. Basic vocabulary of the most important fields (powertrain, body, chassis, electronics, etc.).

Vocabulary exercises, matching definitions, crosswords with technical terms.

Interpreting technical texts (e.g., technical descriptions, component catalogs). Main tenses and passive structures in foreign language technical texts.

Reading comprehension tasks, identifying keywords, extracting the main points.

Interpreting abstracts and introductions of scientific articles. The style and typical expressions of scientific writing.

Analyzing abstracts, identifying keywords and main statements.

Oral communication in a professional context: discussions, asking and answering questions.

Role-playing in professional situations (e.g., discussing component specifications).

Interpreting and explaining technical data and graphs in English.

Describing and comparing data based on graphs.

Giving short professional presentations in English (e.g., presenting a component or technology).

Preparing and delivering presentations in small groups, providing feedback.

Discussion and argumentation on professional topics in English.

Structured debates on technical issues.

Fundamentals of scientific research in automotive engineering. Formulating research questions.

Brainstorming potential research topics, exploring individual areas of interest.

Methods and sources for literature review. Critical evaluation of relevant information.

Searching for literature in online databases, selecting and preliminary analyzing articles.

Preparing a draft research plan: objectives, hypotheses, methods, expected outcomes.

Developing individual or small group draft research plans.

Research plan consultation and feedback. Refining the plans.

Presenting and discussing the developed plans with the instructor and other students.

Practical aspects of vehicle handling and stability. Case studies.

Analyzing simple handling and stability problems.
Examination of vehicle steerability. Steering characteristics.
Basics of steering simulations (if software is available).
Vehicle vibrations and damping. Aspects of comfort and stability.
Analyzing simple vibration models.
Vehicle dynamics fundamentals of active and passive safety systems (e.g., ABS, ESP).
Short case studies on the operation of safety systems.

22. Programme of laboratories

Laboratory activities help to reinforce what you have learned in practice.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basic English technical terms and terminology in the field of automotive engineering.
2. Knows the basic methodology and process of scientific research in the field of automotive engineering.
3. Knows the basic principles of researching and critically evaluating relevant literature.
4. Knows the basic elements of a research plan and the ways of documenting research findings.
5. Knows the basic concepts of vehicle dynamics, the main physical laws governing vehicle motion.
6. Knows the basic characteristics of vehicle handling, stability, and vibrations.

b) skills (k)

1. Is able to interpret and translate English technical texts on automotive engineering topics into Hungarian, and to translate Hungarian content into English.
2. Is able to communicate in English on professional topics, both orally and in writing.
3. Is able to research literature, identify relevant sources, and evaluate them critically.
4. Is able to formulate a simple research question and develop a basic research plan.
5. Is able to interpret the basic phenomena related to vehicle motion.
6. Is able to identify and describe the basic problems related to vehicle handling, stability, and vibrations.

c) attitude (a)

1. Motivated to continuously develop English for automotive engineering.
2. Interested in the methodology of scientific research in the field of automotive engineering.
3. Open to critical thinking and thorough work with literature.
4. Strives for accurate and professional communication in English.
5. Sensitive to understanding the dynamic behavior of vehicles from a design and safety perspective.

d) autonomy and responsibility (o)

1. Is able to independently acquire the basic elements of English for automotive engineering.
2. Is able to independently search for and process literature for their research project.
3. Takes responsibility for preparing their research plan and the progress of the project.
4. Is able to independently understand and describe basic vehicle dynamics problems.
5. Approaches their studies and the achievement of their goals responsibly.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 25%	1. t1-t6,k1-k6,a1-a5,o1-5
2. project assignment	2. PF1	2. 25%	2. t1-t6,k1-k6,a1-a5,o1-5
3. project assignment	3. PF1	3. 25%	3. t1-t6,k1-k6,a1-a5,o1-5
4. project assignment	4. PF1	4. 25%	4. t1-t6,k1-k6,a1-a5,o1-5

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Participation in laboratory sessions, successful completion (min. 40%) of the midterm test and submission of the project assignments of sufficient quality.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

There is a retake option for the midterm test and each project assignment can resubmitted upon request till the end of delayed completion week.

30. Consultation

At a time and in a form agreed with the teacher.

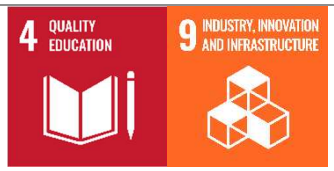
31. Learning materials

Presentation slides

32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Basics of master studies 2.**				
2. Subject name in Hungarian	MSc alapozás 2.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6001-00**			**5. Term | role**	**6 | m**
6. Credits	**9**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**4 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**270 hours**
Contact hours	98 hours	**Preparation for lessons**	20 hours	**Homework**	60 hours
Reading written materials	52 hours	**Midterm preparation**	40 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Nyerges Ádám senior lecturer	**15. Email address**	nyerges.adam@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Nyerges Ádám		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

The objective of this course is to lay the foundation for students' MSc-level studies in the field of automotive engineering. Within this framework, it aims to develop students' English for automotive engineering technical language competencies, introduce them to the methodology of scientific research through a research project, and deepen their knowledge of vehicle dynamics.

20. Programme of lectures

-

21. Programme of practices

-

22. Programme of laboratories

Laboratory activities help to reinforce what you have learned in theory and practice.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basic English technical terms and terminology in the field of automotive engineering.
2. Knows the basic methodology and process of scientific research in the field of automotive engineering.
3. Knows the basic principles of researching and critically evaluating relevant literature.
4. Knows the basic elements of a research plan and the ways of documenting research findings.
5. Knows the basic concepts of vehicle dynamics, the main physical laws governing vehicle motion.
6. Knows the basic characteristics of vehicle handling, stability, and vibrations.

b) skills (k)

1. Is able to interpret and translate English technical texts on automotive engineering topics into Hungarian, and to translate Hungarian content into English.
2. Is able to communicate in English on professional topics, both orally and in writing.
3. Is able to research literature, identify relevant sources, and evaluate them critically.
4. Is able to formulate a simple research question and develop a basic research plan.
5. Is able to interpret the basic phenomena related to vehicle motion.
6. Is able to identify and describe the basic problems related to vehicle handling, stability, and vibrations.

c) attitude (a)

1. Motivated to continuously develop English for automotive engineering.
2. Interested in the methodology of scientific research in the field of automotive engineering.
3. Open to critical thinking and thorough work with literature.

4. Strives for accurate and professional communication in English.
5. Sensitive to understanding the dynamic behavior of vehicles from a design and safety perspective.

d) autonomy and responsibility (o)

1. Is able to independently acquire the basic elements of English for automotive engineering.
2. Is able to independently search for and process literature for their research project.
3. Takes responsibility for preparing their research plan and the progress of the project.
4. Is able to independently understand and describe basic vehicle dynamics problems.
5. Approaches their studies and the achievement of their goals responsibly.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. project assignment 3. project assignment 4. project assignment	1. ZH 2. PF1 3. PF1 4. PF1	1. 25% 2. 25% 3. 25% 4. 25%	 1. t1,k1,a1,o1 2. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Participation in laboratory sessions, successful completion (min. 40%) of the midterm test and submission of the project assignments of sufficient quality.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

There is a retake option for the midterm test and each project assignment can resubmitted upon request till the end of delayed completion week.

30. Consultation

At a time and in a form agreed with the teacher.

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Basics of operational engineering 1.**				
2. Subject name in Hungarian	Üzemmérnöki alapok 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ5002-00**			**5. Term | role**	**5 | m**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**0 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	10 hours	**Homework**	50 hours
Reading written materials	14 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Tulipánt Gergely		

18. Indicative prerequisites
- - -, - - -, - - -

19. Purpose

The course aims to introduce students to the fundamentals of operational engineering, focusing on occupational safety, legal and ethical compliance, and production organization. Through a comprehensive project assignment, students develop core engineering thinking, teamwork skills, and responsible decision-making, all essential for professional engineering practice.

20. Programme of lectures

-

21. Programme of practices

1. Occupational Safety Basics
Fundamental concepts of workplace safety
Safety regulations in industrial and laboratory environments
Personal protective equipment and accident prevention practices
2. Legal Basics: Ethics and Compliance
Engineering ethics and professional responsibility
Introduction to compliance principles and practical application
Case studies and interactive situational exercises
3. Introduction to Operations Management
Basic production models and organizational methods
Comparison of manufacturing and service processes
Introduction to efficiency and quality management principles
4. Project Work I – Project Planning and Definition
Team formation, topic and goal setting
Scheduling and assigning responsibilities
Preparing a research and data collection plan
5. Project Work II – Implementation and Analysis
Collecting and processing practical data
Analyzing results and drawing conclusions
Problem-solving and evaluating alternatives
6. Project Work III – Presentation and Feedback
Group presentations of project results
Evaluation and reflective discussion
Summarizing individual and group takeaways

22. Programme of laboratories

Laboratory activities help to reinforce what you have learned in the practical sessions.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understands the basic principles of occupational safety and workplace risk management.
2. Recognizes the importance of legal and ethical compliance in engineering.
3. Possesses foundational knowledge of production and operations management.

b) skills (k)

1. Able to identify and assess safety-critical situations in the workplace.
2. Capable of planning and executing a small-scale engineering project in a team setting.
3. Able to apply basic organizational and operational principles in problem-solving contexts.

c) attitude (a)

1. Demonstrates commitment to safe, ethical, and regulation-compliant engineering practice.

d) autonomy and responsibility (o)

1. Can carry out a small project independently or contribute effectively in a group, taking responsibility for specific tasks.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 25%	1. t1-t3,k1-k3,a1,o1
2. project assignment	2. PF1	2. 25%	2. t1-t3,k1-k3,a1,o1
3. project assignment	3. PF1	3. 25%	3. t1-t3,k1-k3,a1,o1
4. project assignment	4. PF1	4. 25%	4. t1-t3,k1-k3,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Participation in laboratory sessions, successful completion (min. 40%) of the midterm test and submission of the project assignments of sufficient quality.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

There is a retake option for the midterm test and each project assignment can resubmitted upon request till the end of delayed completion week.

30. Consultation

At a time and in a form agreed with the teacher.

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Basics of operational engineering 2.**				
2. Subject name in Hungarian	Üzemmérnöki alapok 2.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6002-00**			**5. Term | role**	**6 | m**
6. Credits	**9**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**4 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**270 hours**
Contact hours	98 hours	**Preparation for lessons**	20 hours	**Homework**	60 hours
Reading written materials	52 hours	**Midterm preparation**	40 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Harth Péter senior lecturer	**15. Email address**	harth.peter@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Harth Péter		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The objective of this course is to provide students with a comprehensive overview of the fundamental aspects of industrial engineering, introducing them to the basic principles of business economics, practical quality management methods, the development of professional self-awareness, and practical experience through the successful completion of a project assignment.

20. Programme of lectures

Week 1: Introduction to Industrial Engineering: Course objectives, syllabus, requirements. The industrial engineering mindset.

Weeks 2-3: Fundamentals of Business Economics: Basic concepts of enterprises, business operations. Costs, revenues, profit. Fundamental economic indicators.

Weeks 4-6: Practical Quality Management: The concept of quality, its dimensions. Quality management systems (brief overview). Basic quality management tools and methods (e.g., Pareto chart, Ishikawa diagram, flowchart).

Weeks 7-8: Professional Self-Awareness and Communication: Self-awareness models. Identifying strengths and weaknesses in engineering work. Basics of career planning. Effective communication and teamwork.

Weeks 9-12: Fundamentals of Project Management: Planning, scheduling, resource management, risk management. Aspects of preparing project reports.

Weeks 13-14: Presentation of Project Results. Drawing conclusions. Summary of the semester.

21. Programme of practices

Week 1: Forming groups for the project assignment. Introduction of the project assignment, topic selection, initial brainstorming. Outlining the semester schedule.

Weeks 2-3: Case studies on cost management and pricing. Simple economic analysis tasks in group work. Preliminary consideration of the business aspects of the project assignment.

Weeks 4-6: Analyzing quality issues in group work using the learned tools. Case studies on quality assurance processes. Identifying the quality aspects of the project assignment.

Weeks 7-8: Self-awareness tests, reflection exercises. Role-playing to practice communication situations. Group discussions on project progress, addressing emerging problems.

Weeks 9-12: Intensive group work on the project assignment. Planning, executing, and documenting the sub-tasks of the project. Instructor consultations on project progress.

Weeks 13-14: Group project presentations. Evaluation of project reports. Providing feedback on student work.

22. Programme of laboratories

Laboratory activities help to reinforce what you have learned in the practical sessions.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basic concepts and interrelationships of business economics and the fundamental principles of business operations.
2. Knows cost and pricing methods, as well as basic economic analysis indicators.
3. Knows the fundamental concepts of quality management, the role of quality assurance and continuous improvement.
4. Knows the basic principles of the most commonly used quality management tools and methods.
5. Knows the basic models of professional self-awareness and the steps of career planning.
6. Knows the fundamental principles of effective professional communication and collaboration.
7. Knows the basic concepts of project management, the steps of project planning, execution, and evaluation.

b) skills (k)

1. Is able to perform basic economic analyses and interpret the results.
2. Is able to identify and analyze simple quality issues using the learned tools.
3. Is able to independently assess their own strengths and areas for development in the engineering profession.
4. Is able to communicate and collaborate effectively in group work during the implementation of the project assignment.
5. Is able to prepare and implement a project plan in group work to solve a given problem.
6. Is able to present the results of the project orally and in writing.

c) attitude (a)

1. Open to the multidisciplinary approach of industrial engineering.
2. Sensitive to the importance of quality in the production of goods and services.
3. Committed to continuous professional development and open to self-awareness work.
4. Cooperative and constructive in group work, respects the opinions of others.
5. Proactive in solving problems and takes responsibility for their own and the group's work.

d) autonomy and responsibility (o)

1. Is able to independently gather and process information on topics related to the course.
2. Is able to independently plan and execute tasks in project work.
3. Takes responsibility for their own learning process and the results of the group project assignment.
4. Acts responsibly with the available resources during the implementation of the project.
5. Critically evaluates their own and their group's work and is able to draw conclusions.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 25%	1. t1-t7,k1-k6,a1-a5,o1-o5
2. project assignment	2. PF1	2. 25%	2. t1-t7,k1-k6,a1-a5,o1-o5
3. project assignment	3. PF1	3. 25%	3. t1-t7,k1-k6,a1-a5,o1-o5
4. project assignment	4. PF1	4. 25%	4. t1-t7,k1-k6,a1-a5,o1-o5

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Participation in laboratory sessions, successful completion (min. 40%) of the midterm test and submission of the project assignments of sufficient quality.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

There is a retake option for the midterm test and each project assignment can resubmitted upon request till the end of delayed completion week.

30. Consultation

At a time and in a form agreed with the teacher.

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Control engineering**				
2. Subject name in Hungarian	Irányítástechnika			**3. Programme**	jkl
4. Subject code	**BMEKOKJBSM4001-00**			**5. Term | role**	**4 | k**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	32 hours	**Midterm preparation**	32 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Tettamanti Tamás professor	**15. Email address**	tettamanti.tamas@kjk.bme.hu
16. …organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Tettamanti Tamás, Dr. Varga Balázs, Wágner Tamás, Ormándi Tamás		
18. Indicative prerequisites	BMETE90AX00 Matematika A1a recommended core, BMEKOKJBSM2001-00 Elektrotechnika - elektronika recommended core, - - -		

19. Purpose

The Control Engineering course covers the fundamentals of classical and modern control engineering for linear, time-invariant systems. This includes the basics of system theory (modeling, identification, time-domain and frequency-domain analysis, stability), frequency-domain control (basic transfer functions, series compensation, PID control, filters), state-space theory based modeling and control (state feedback structure, pole placement, LQ control, discrete-time modeling, Kalman filtering). Students who complete the course will be able to interpret, apply and design industrial control solutions in automotive engineering, transport engineering and logistics.

20. Programme of lectures

In the Control Engineering lectures, students learn the basics of classical and modern control engineering for linear, time-invariant systems through practical examples (from automotive, transport, and logistics fields). The lectures will be presented in Matlab Live Script format in order to demonstrate the applicable methods directly in algorithmic form and to allow the students to easily try them in an interactive way. Lecture topics: basic concepts of control engineering, control design process, time domain analysis of system properties, BIBO stability, Laplace transformation, mathematical modeling of systems, transfer function, system identification, description of systems with basic transfer functions, control block diagram, frequency domain, Bode diagram, closed loop systems analysis, series compensation structure, PID control, tuning of PID control, filters, physical realization of controls/filters, state space theory, state space canonical forms, relationship between transfer function and state space, state space properties (stability, controllability), feedback control structure, pole placement, LQ control, state space identification, discrete-time state space, discrete-time LQ control, Kalman filtering.

21. Programme of practices

In the practical part of the Control Engineering course, students will learn the basics of classical and modern control engineering for linear, time-invariant systems by solving practical examples. Topics of the exercises: system modeling (electronic and mechanical systems), time domain analysis, stability analysis, Laplace transformation, transfer function calculation, frequency domain analysis, application of Bode diagrams, series compensation problems, state space theory based modeling and analysis (stability, controllability), application of feedback control structure (pole placement, LQ control), discrete time state space, discrete time LQ control.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knowledge of the basic modeling, analysis and regulation paradigms of the control engineering for linear, time-invariant systems in the field of vehicle engineering, transport and logistics. (J:T9,T15)

b) skills (k)

2. The student understands the modeling approach and the regulation method used for a given control problem for linear, time-invariant systems in the field of vehicle engineering, transport and logistics.
(J:K10,K11,K12,K17,K36,K40,K42,K43,K44;K:K10,K11,K12,K17,K28,K32,K34,K35,K36;L:K10,K11,K12,K17,K31,K35,K37,K38,K39)

c) attitude (a)

3.The student is interested in the implementation of system modeling and control in the field of vehicle engineering, transport and logistics. (J,K,L:A2)

d) autonomy and responsibility (o)

4. The student is able to independently resolve a given control problem in the field of vehicle engineering, transport and logistics. (J,K,L:O1,O3)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. written midterm test 1. 2. written midterm test 2. 4. four electronic practice assignments	1. ZH1 2. ZH2 3. EF	1. 40% 2. 40% 3. 20%	1. t1,k1,a1,o1 2. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Successful completion of the midterm tests (min. 50% each), successful completion of the 4 electronic practice assignments (min. 85% each).

27. Grading rules

Excellent 92-100%
Good 79-91%
Satisfactory 67-78%
Pass 50-66%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is allowed for both midterm tests.

30. Consultation

There will be a practical lesson and a consultation before the midterm exam. Moreover, consultation is possible at a time and in a form agreed with the teacher.

31. Learning materials

Matlab Live Script materials for lectures/tutorials/e-laboratories shared on the Moodle site of the course, T. Tettamanti and Q. Lu, Lecture Notes on Control Theory, Budapest: Akadémiai Kiadó, ISBN: 9789634543377, doi:10.1556/9789634543377, https://mersz.hu/tamas-qiong-lecture-notes-on-control-theory, 2019.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Diesel motion power**				
2. Subject name in Hungarian	Dízel vontatójárművek			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ5F01-00**			**5. Term | role**	**5 | sp**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	26 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Zábori Zoltán tudományos főmunkatárs	**15. Email address**	zabori.zoltan@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Kiss Csaba		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

To introduce railway specialization students to the basics and specifics of the construction, operation, and structure of railway diesel traction vehicles.

20. Programme of lectures

General overview of railway diesel engines. Motor cycles, air ratio, degree of charge. Diesel engine losses, efficiency, fuel consumption. Characteristic curves, speed and charge control of diesel engines. Charge systems, engine and supercharger cooperation. Charge exchange control, valve drive systems. Fuel metering systems, mixture formation, combustion chamber, combustion process, energy conversion, air pollution. Structural structure of diesel engines, main units. Balancing of mass forces and torque, torsional oscillations. Regulators, engine cooling and lubrication systems. Air filtration, noise reduction, starting of diesel engines. Main tasks of diesel engine maintenance, structure of maintenance systems. Comparison of railway power transmission systems, their characteristics. Traction force development in the wheel-rail connection, this is the force connection factor and its characteristics. Specific properties of railway mechanical power transmission elements, reverse and axle drives. Structural design and operating characteristics of railway hydrodynamic power transmissions, hydrodynamic torque converters and clutches. The hydraulic cycle. Cooperation of the diesel engine and hydrodynamic elements. Electrical power transmission systems of railway diesel traction vehicles. Characteristics of generators, controlled cooperation of engine and generator. Supply of direct and alternating current traction motors, operating characteristics. Derivation of the traction force curve.

21. Programme of practices

Numerical determination of the traction curve of a hydrodynamic and electric diesel traction vehicle.

22. Programme of laboratories

Measurements related to the operation of the diesel engine: measurement of characteristic curves, determination of heat balance. Computer laboratory simulations to study certain operating processes of a diesel engine. Measurements related to railway power transmission (measurement of force relationship factor) as well as computer laboratory simulation tests to study the characteristics of power transmissions.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the characteristics and main elements of diesel railway traction vehicles.
2. Knows the basic relationships of traction vehicle systems and their application possibilities.

b) skills (k)

1. Is able to navigate the system of physical concepts and units used in vehicle technology.
2. Is able to recognize and navigate the specifics related to railway diesel traction vehicles.
3. Is able to determine basic diesel railway traction vehicle characteristics.

c) attitude (a)

1. Is open and receptive to new knowledge.
2. Meets the expectations of engineering work – demanding, clear and precise.

d) autonomy and responsibility (o)

1. Takes the first step without waiting for what others say or do.
2. Expresses own opinion on issues related to railway vehicles.
3. Solves the own task and controls it.
4. Takes responsibility for the correct documentation of the methods and procedures used.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. I. Midterm test 2. II. Midterm test	1. ZH1 2. ZH2	1. 20% 2. 20%	1. t1,t2,k1-k3,a1,a2,o1-o4 2. t1,t2,k1-k3,a1,a2,o1-o4

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Exam	1. V	1. 60%	1. t1,t2,k1-k3,a1,a2,o1-o4

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm tests

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

According to the rules set out in the AER.

29. Retake and delayed completion

The midterm tests can be retaken separately, with one retake and one repeated retake.

30. Consultation

At a time and in a format agreed upon with the instructor.

31. Learning materials

1. Dr. Sostarics György -Dr. Balogh Vilmos: Railway vehicles (in Hungarian). Course book, ISBN: 963-18-3113-2 2. Prof. Dr. Zobory István: Railway technology handbook (in Hungarian). ISBN: 9789632041278 3. Varga Jenő (ed.): Railway diesel traction units (in Hungarian). Műszaki Könyvkiadó, 1974 4. Course materials.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Electric motive trains**				
2. Subject name in Hungarian	Villamos vasutak			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ4F02-00**			**5. Term | role**	**4 | sp**
6. Credits	**8**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**3 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**240 hours**
Contact hours	84 hours	**Preparation for lessons**	42 hours	**Homework**	0 hours
Reading written materials	66 hours	**Midterm preparation**	28 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Zábori Zoltán tudományos főmunkatárs	**15. Email address**	zabori.zoltan@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Zábori Zoltán, Hillier István, Dr. Tulipánt Gergely		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

To introduce future railway vehicle engineers to the vehicle-side and track-side characteristics of electric traction. It presents the characteristics of direct current and alternating current locomotives, as well as the characteristics of current converters found on traction vehicles.

20. Programme of lectures

Drive systems of electric traction units (traditional or DC chopper system), layout, principle of operation. Main circuit of vehicles equipped with DC chopper. Control of the vehicles used chopper systems. Main circuit of vehicles having semi- or totally controlled rectifier bridges. Vehicles with asynchronous motors, methods of controlling of the tractive/breaking effort. Basic circuit of electric traction energy supply systems. Catenary system and third rail. Layout of the catenary system. Electric control systems of the electric traction units. Leaderships of the modern units. Operation method of the relay based control systems. Pantograph systems and switches. Tranformers and additional equipments of electric units. Rectifiers, inverters and contactors. Auxiliary devices, lighting-, heating and battery charger systems.

21. Programme of practices

The topics of the exercises are related to the calculation assignments issued as homework during the semester, during which the students select a traction motor suitable for certain traction tasks, determine the traction and power requirements of traction vehicles and calculate the electric traction motor heating.

22. Programme of laboratories

Test bench study of DC electric machine group cooperation; Measuring the transient states of a DC machine group; Simulation study of heating of a traction electric machine; Simulation study of the electromechanical processes of the propulsion system of an electric traction vehicle

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the structure of the railway system, its actors, the regulations and processes related to the licensing and operation of vehicles
2. Knows the type test of railway vehicles
3. Knows the safety and occupational safety rules of railway operation, the methods of technical rescue
4. Recognizes markings used in railway operation
5. Knows the technical equipment of railway vehicle depots.
6. Knows the performance and reliability characteristics related to the operation of railway vehicles
7. Knows inventory task related to the operation of railway vehicles
8. Knows the basic principle of track-vehicle system diagnostics

b) skills (k)

1. Is able to compile and systematize relevant specifications and necessary type test measurements from the point of view of the homologation of a given railway vehicle.
2. Is abble to explain the tasks of the different railway conformity assessment bodies and their interconnections.
3. Is able to determine and analyse the reliability characteristics of railway vehicles.
4. Is able to use simple inventory procedures.
5. Is able to create computer implementations for the evaluation of vehicle diagnostic signals based on simple algorithms.

c) attitude (a)

1. Is independently interested and open to new technical solutions and procedures in the field.
2. Strives to increase the quality and reliability of railway rolling stock operation

d) autonomy and responsibility (o)

1. Keeps and makes others comply with work protection and railway safety regulation)
2. Takes on responsibility for compliance of the procedures applie

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test	1. ZH	1. 25%	1. t1-t3,t7,k1,k2,o1,o2
2. Railway vehicle marking system assignment	2. F1	2. 5%	2. t4,a1,a2,o1
3. Wheel load assignment	3. F2	3. 5%	3. t5,a1,a2,o2
4. Inventory assignment	4. F3	4. 5%	4. t6,k3,a1,a2,o2
5. Reliability assignment	5. F4	5. 5%	5. t7,k5,a1,a2,o2
6. Diagnostics assignment	6. F5	6. 5%	6. t8,k6,a1,a2,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	1. 50%	1. t1-t3,k1,k2,k4,k6,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

Successful completion of the midterm test (min. 50%) and submission of the assignments by the deadline or on the lessons.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

29. Retake and delayed completion

The midterm tests can be replaced with the replacement test written in the delayed completion week

30. Consultation

At a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Electrotechnics - Electronics**				
2. Subject name in Hungarian	Elektrotechnika - Elektronika			**3. Programme**	jkl
4. Subject code	**BMEKOKJBSM2001-00**			**5. Term | role**	**2 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**3 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	14 hours	**Homework**	16 hours
Reading written materials	26 hours	**Midterm preparation**	24 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Szabó Géza associate professor	**15. Email address**	szabo.geza@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Szabó Géza		
18. Indicative prerequisites	BMEKORHBSM1001-00 Mérnöki alapismeretek recommended core, - - -, - - -		

19. Purpose

The aim of the course is to introduce the most important engineering topics in electronics and electrical engineering and to provide a basic level of proficiency.

20. Programme of lectures

It provides basic engineering knowledge of principles of electrotechnics, of its measurements, of its basic models. Introduces students to the operating principles of the basic elements of electronics, to their parameters, features, characteristics as well as their selection/engineering options. It also introduces the students to the schematics, modelling and analysis principles of amplifying and switching circuitry, and shows the special transportation and vehicle applications. It presents the principles and main parameters of electrical machines as well as their application in vehicle and transportation.

21. Programme of practices

Application of the principles presented on lectures, solving exercises. The aim is to teach independent application of circuit principles and independent problem solving.

22. Programme of laboratories

Laboratory measurements from selected topics.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. understands the basic principles and basic relationships of electrotechnics, the operation, symbols, features and characteristics of basic electronic components, the amplifying and switching circuits, and the working principles of electrical machines. (J,K,L:T2,T4,T6,T7)

b) skills (k)

1. is able to understand and analyze the operation of simple electronic circuits. (J,K,L:K10,K17;J:K36,K42;K:K28,K34;L:K31,K37)

c) attitude (a)

1. participates in solving basic electric problems in the field of transport or vehicle, to work efficiently and willingly with specialists of other fields (in particular: electrical engineering). (A2)

d) autonomy and responsibility (o)

1. is aware of and treats the responsibility associated with the task solution during electric and electronic system problem solving and analysis. (O1,O3)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 9%	1. t1,k1,a1,o1
2. midterm test	2. ZH2	2. 9%	2. t1,k1,a1,o1

3. homework 4. laboratory measurement and report 5. laboratory measurement and report 6. laboratory measurement and report	3. HF1 4. LJ1 5. LJ2 6. LJ3	3. 4% 4. 4% 5. 4% 6. 4%	3. t1,k1,a1,o1 4. t1,k1,a1,o1 5. t1,k1,a1,o1 6. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. V	1. 66%	1. t1,k1,a1,o1

26. Criteria to obtain a signature / midterm grade

During the semester: two midterm tests, one homework and laboratory measurements with their report about the results.

27. Grading rules

0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent

28. Attendance and participation requirements

According to the rules of CoS.

29. Retake and delayed completion

The midterm tests have individual re-tests and second (paid) re-tests; the second (paid) re-test can be taken only if a test or a re-test has been taken. Homework can be corrected or submitted during the delayed completion week (paid). The laboratory practices can be re-taken during the delayed completion week; protocols about labs can be submitted or corrected during the delayed completion week (paid).

30. Consultation

At a time and in a form agreed with the teacher.

31. Learning materials

1. Uray-Szabó: Elektrotechnika tk. 1989.
2. Sárközy: Elektrotechnika, Egyetemi jegyzet
3. Parádi (szerk.): Elektrotechnika gyakorlatok, Egyetemi jegyzet
4. Kohut (szerk.): Elektrotechnika példatár, Egyetemi jegyzet
5. Szabó G.: Elektrotechnika – Elektronika 2012, Typotex Kiadó, ISBN 978-963-279-587-4
6. Lecture notes

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Engineering drawing 1.**				
2. Subject name in Hungarian	Mérnöki rajz 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ2002-00**			**5. Term | role**	**2 | k**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	20 hours	**Homework**	30 hours
Reading written materials	14 hours	**Midterm preparation**	30 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Lovas László associate professor	**15. Email address**	lovas.laszlo@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Lovas László, Dr. Török István, Győri Márk		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Preparing future engineers in the basics of graphical communication in engineering

20. Programme of lectures

Elements of space geometry, basic theorems. Definition and properties of point, line and plane. Intersection of lines and planes. Intersection of curved shaped solids and lines. Intersection and projection of plane-shaped bodies.

Basics of representation methods: perspective, axonometry, projections.

Part drawings. Algorithm of drawing. Basics of technical drawing: types of projections and sections. Dimensioning, dimension system, text instructions. Indication of holes, slope, and conicity. Relationship between drawing and production. Simplified representations: threads, gears, splines.

21. Programme of practices

Basic notions of descriptive geometry, basic constructions. Axonometric and projection views. Technical representation: projections, cutouts, sections, simplified representation. Dimensioning of parts.

CAD software use, particularities of the 3D modeling. Building 3D models, generating and completing 2D drawings.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the national and international requirements, regulations, and guidelines to ensure that products, services and processes are of good quality and fit for purpose. (T2)
2. Knows the concepts and problem solving methods in the field of vehicles and mobile machines. (T10)
3. Knows the computer communication and the main software applications in the field. (T17)

b) skills (k)

1. Able to read and interpret technical drawings and documentation prepared by other engineers (K13)
2. Able to build, repair, model, or operate a product from a technical drawing or technical documentation. (K14,K26)
3. Creates technical plans and drawings using special software. (K18)
4. Uses computer-aided design software. (K45)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of his/her team (A15)

2. is receptive and proactive in the performance of the tasks assigned to him/her, self-critical of the tasks assigned to him/her (A11,A12,A13,A14)

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

2. makes responsible decisions in solving managerial tasks in his/her chosen field of activity, formulating independent proposals to solve the challenges identified (O5)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF1	1. 10%	1. t1,t2,k3,k4,a1 a2,o1,o2
2. homework	2. HF2	2. 13%	2. t1,t2,k3,k4,a1,a2,o1,o2
3. homework	3. HF3	3. 23%	3. t1,t2,k3,k4,a1,a2,o1,o2
4. midterm test	4. ZH1	4. 27%	4. t1,t2,a1,a2,o1,o2
5. midterm test	5. ZH2	5. 27%	5. t1,t2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The two tests and the homeworks written during the semester are evaluated by a point system, the sum of which results in the semester mark; the semester mark is determined on the basis of the semester points.

The conditions for obtaining a semester mark are:

- attendance of 70% of the practice classes;
- 40% of the sum of test points;
- the sum of the homework and test points reaches 40% of the total;
- the sum of points reaches 50% of the total.

27. Grading rules

Excellent 84-100%
Good 72-83%
Satisfactory 62-71%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Combined retake test from the topics of all the midterm tests.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides, presentation and practice videos, lecture notes

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Engineering drawing 2.**				
2. Subject name in Hungarian	Mérnöki rajz 2.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ3001-00**			**5. Term | role**	**3 | k**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	12 hours	**Homework**	24 hours
Reading written materials	6 hours	**Midterm preparation**	22 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Ficzere Péter associate professor	**15. Email address**	ficzere.peter@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Lovas László, Dr. Ficzere Péter, Dr. Török István, Győri Márk		
18. Indicative prerequisites	BMEKOVJBSJ2002-00 Mérnöki rajz 1. recommended core, - - -, - - -		

19. Purpose

Continuation of what has been started in Engineering drawing 1. Modelling assemblies of multiple parts. Drawing of typical parts, use of part libraries, parametrized modelling. Basics of standardization, use of standards.

20. Programme of lectures

Modelling assemblies of multiple parts. Structure and characteristics of assembly drawings. Bolted link drawings and bolt fixation. Shaft-hub assembly drawings. Symbols of welding, welded structure drawings. Spring drawings of various type. Riveted assembly drawings. Basics of CAD theory. Drawing analysis, understanding of drawing. Detail drawings. Role and types of product documentation. Technical drawing in integrated corporate data handling softwares. Application of computer assisted drawing and documentation making. Drawing of typical parts, use of part libraries, parametrized modelling. Basics of standardization, use of standards.

21. Programme of practices

Guided exercise solving in the field of part assembly technical drawing.

22. Programme of laboratories

Application of computer assisted drawing and documentation making

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows and understands the mutual position of space elements, knows the rules and symbols of engineering drawings. (T2,T10,T17)

b) skills (k)

1. is able to visualize solid objects from two-dimensional drawings with depth perception and represents solid objects in two dimensions. (K13,K14,K18,K26,K45,S1)

c) attitude (a)

1. aims to create exact, aesthetic and obvious drawings. (A11,A12,A13,A14,A15)

d) autonomy and responsibility (o)

1. is able to create technical drawing documentation; is aware of the significance of his work and the consequences of mistakes. (O5)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF1	1. 16,6%	1. t1,k1,a1,o1
2. homework	2. HF2	2. 16,7%	2. t1,k1,a1,o1
3. homework	3. HF3	3. 16,7%	3. t1,k1,a1,o1
4. midterm test (on computer)	4. ZH-SZG	4. 25%	4. t1,k1,a1,o1

5. midterm test (classroom)	5. ZH-K	5. 25%	5. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The two tests and the homeworks written during the semester are evaluated by a point system, the sum of which results in the semester mark; the semester mark is determined on the basis of the semester points.

The conditions for obtaining a semester mark are:

- attendance of 70% of the practice classes;
- 40% of the sum of test points;
- the sum of the homework and test points reaches 40% of the total.

27. Grading rules

Excellent 84-100%
Good 72-83%
Satisfactory 62-71%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Midterm test correction possibility in the delayed completion period.

30. Consultation

at a time and in a form agreed with the lecturers and instructors

31. Learning materials

Lecture slides; lecture videos, practice videos;
Lovas L. szerk.: Műszaki ábrázolás I. online texbook, Typotex Kiadó;
Frischherz, Dax, Gundelfinger, Häffner, Itschner, Kotsch, Staniczek: Fémtechnológiai táblázatok. B+V Lap- és Könyvkiadó Kft. 1997;
Bándy A.: Műszaki ábrázolás (Táblázatok). Egyetemi jegyzet, 71080, Műegyetemi Kiadó (recommended literature);
Bándy A.: Miből készül? Hogyan készül? elektronikus jegyzet. (recommended literature)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Flight mechanics and aero structures**				
2. Subject name in Hungarian	Repülésmechanika és repülőgépek szerkezete			**3. Programme**	j
4. Subject code	**BMEKORHBSJ5B01-00**			**5. Term | role**	**5 | sp**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	15 hours	**Homework**	20 hours
Reading written materials	25 hours	**Midterm preparation**	20 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Jankovics István, Dr. Rohács József		
18. Indicative prerequisites	BMEKORHBSJ4B01-00 Aerodinamika recommended core, BMEKOGJBSJ2001-00 Anyagismeret és anyagtechnológia recommended core, - - -		

19. Purpose

his course provides an introductory overview of flight mechanics and aircraft structures. Students will become familiar with typical flight conditions, aircraft performance characteristics, and optimal operating modes. The course introduces the fundamentals of both static and dynamic stability of aircraft. It also covers the types of loads acting on an aircraft and the associated design requirements. Students will gain insight into common structural configurations, methods for determining aerodynamic loads, as well as the materials and fastening elements commonly used in the aerospace industry.

20. Programme of lectures

Production of thrust. Performance characteristics of aircraft propulsion systems. Measurement of airspeed. Reference frames. Steady level flight, climbing, gliding, turning. Take-off and landing. Optimal flight modes. Load and fligiht envelope. 6d of equation of motion of aircraft Basics of static and dynamic stability, control of aircraft. Main structural units of aircraft (wing, fuselage, tail, landing gear, engine mounts). Strength requirements, EASA and FAR rules. Loads on wings and tails. Construction methods of aircraft components. Fasteners. Composite materials and processes. Aeroelastic phenomena, divergence, control reversal, flutter. Station identification. Aircraft alignment and symmetry.

21. Programme of practices

Solving and practicing numerical examples

22. Programme of laboratories

computer simulations

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the flight mechanics and aero structure technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies in flight mechanics and aero structure in a meaningful way
2. is able to communicate the ideas and plans about flight mechanics clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. independent calculation task	1. ZH 1. HF	1. 40% 2. 20%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 40%	1. t1,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

submission of homwork on time and successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Fluid dynamics, thermodynamics and heat transfer 1.**				
2. Subject name in Hungarian	Hő- és áramlástan 1.			**3. Programme**	jkl
4. Subject code	**BMEKORHBSM3001-00**			**5. Term | role**	**3 | k**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	22 hours	**Exam preparation**	32 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai Csaba, Jankovics István, Dr. Veress Árpád		
18. Indicative prerequisites	BMEKORHBSM1001-00 Mérnöki alapismeretek recommended complementary, BMETE90AX02 Matematika A2a recommended complementary, - - -		

19. Purpose

Understanding the basic thermodynamic, heat transfer and flow processes, learning their theoretical and practical aspects

20. Programme of lectures

Introduction: Systems, Fluid dynamics, thermodynamics and heat transfer and their applications in logistics, transportation and vehicle engineering, Continuum mechanics, Kinetic theory of gases, introduction of basic parameters (ρ, v, p, T), equations of state. Fluid dynamics: Liquids, steams, and gases in p-v-T state space (compressible and incompressible mediums), Description of fluid motions according to Euler and Lagrange, The principle of mass, momentum and energy conservation laws, Hydrostatics, Newtonian fluid, The basic laws of viscous flow, Boundary layer, Boundary layer separation, Internal, external and cascade flows, Fluid dynamics in and around of logistics', transportation's and vehicle's systems – forces and coefficients, Similarity theory of fluids, Compressible fluids: sound speed in liquids and gases, Pressure waves, Doppler's effect, Sound barrier, Mach cone, Allievi's water hammer effect. Thermodynamics: Heat and specific heat, The 1st law of thermodynamics, Thermodynamic processes, The 2nd law of thermodynamics, Cycles, useful work, thermal efficiency and coefficient of performance, Air with moisture and corresponding processes, Introduction to heat transfer – classification, principles, characteristics, applications and their conditions.

21. Programme of practices

After each topic covered in the lecture, we will work together to solve simple but useful computational examples so that you can learn the application step by step - not only in theory, but also in practice.

22. Programme of laboratories

Temperature measurement of gases. Measurement of thermodynamic processes. Determination the ratio of specific heats by experiments. Investigation of thermodynamic processes in moist air. Reynolds experiment. Volume flow measurement. Determination of contraction factor. Jet engine model.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the theoretical together with measurement- and analytical calculation-based practical aspects of the studied chapters in fluid dynamics, technical thermodynamics and heat transfer in continuum flow regime with especial care for the logistics, transportation and vehicle engineering, meanwhile she/he knows the advantages, disadvantages, conditions and application ranges of the different processes and methods; (J,K,L:T4,T7;J:T9)

2. knows the relevant professional literature, she/he knows the way of finding, questing the needed detailed technical information about the investigated problem and the student knows and the student is able to use diagrams and tables in the field of fluid dynamics, thermodynamics and heat transfer. (J,K,L:T4,T7;J:T9)

b) skills (k)

1. can complete theoretical and practical (measurements, experiments, tests and calculations) tasks in the field of fluid dynamics, technical thermodynamics and heat transfer in line with the content of the subject in the field of maintenance and developments with verification, plausibility check and validation (in case of relevancies) (J,K,L:K10,K11,K17;J:K22,K26,K27,K29,K32,K33,K36;K:K28;L:K31)

2. can recognise the desired modifications (e.g.: improvements and developments) in the fields of the subject, the student can perform the needed actions for changes and can check, analyse and understand the results of the modifications. (J,K,L:K10,K11,K17;J:K22,K26,K27,K29,K32,K33,K36;K:K28;L:K31)

3. can understand complex systems and processes, can plan, monitor, evaluate and making decision together with considering all external and internal effects acting on the investigated activity and the effects of her/his activity on other systems. (J,K,L:K10,K11,K17;J:K22,K26,K27,K29,K32,K33,K36;K:K28;L:K31)

c) attitude (a)

1. aims to complete the studies at the highest level, under the shortest time, by providing the knowledge and capacity at the best to obtain knowledge for deep and independent professional work; (J,K,L:A2)

2. cooperates with professors and mates during the studies; (J,K,L:A2)

3. continuously increases the knowledge independently by having information from the external literature given by the lectures to complete the studies; (J,K,L:A2)

d) autonomy and responsibility (o)

1. completes the homework, reports about laboratory practices and makes exercises about calculation tasks independently; (J,K,L:O3)

2. takes responsibility for guiding mates by the quality of the work and by keeping ethic norms; (J,K,L:O3)

3. takes responsibility for applying the knowledge in line with the studied conditions, limitations and constraints; (J,K,L:O3)

4. can friendly accept the well-established constructive criticism and can utilize that in future; (J,K,L:O3)

5. can accept the form of the cooperation; she/he can work alone or in a team member depends on the actual situation; (J,K,L:O3)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. laboratory measurement records	1. ZH 2. LJK	1. 35% 2. 15%	1. t1,t2,k1-k3,a1-a3,o1-o5

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. V	1. 50%	1. t1,t2,k1-k3,a1-a3,o1-o5

26. Criteria to obtain a signature / midterm grade

To obtain the signature, you must successfully complete the midterm test and the laboratory exercises, and submit a correct report of the laboratory measurements by the deadline.

27. Grading rules

Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%

28. Attendance and participation requirements

According to the rules of Study and Examination Regulations.

29. Retake and delayed completion

One of the labs and the mid-term exam can be made up as part of a make-up.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Materials about the lectures, tutorials provided by the professor.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Fluid dynamics, thermodynamics and heat transfer 2.**				
2. Subject name in Hungarian	Hő- és áramlástan 2.			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4001-00**			**5. Term | role**	**4 | k**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	10 hours
Reading written materials	15 hours	**Midterm preparation**	13 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba, Dr. Veress Árpád		
18. Indicative prerequisites	BMEKORHBSM3001-00 Hő és áramlástan 1. recommended core, - - -, - - -		

19. Purpose

Expansion of the basic knowledge of thermodynamics and fluid mechanics discussed in the Heat and Fluid Mechanics 1 course to the BSC Vehicle Engineering level. Overview, characterization and role of machines operating on the principles of thermal and fluid mechanics discussed in the course in the devices used in transportation.

20. Programme of lectures

Energetic investigation of non-solid materials (thermology): Heat transfer (heat conduction, heat transfer, heat emission and heat radiation), Gas mixtures, Thermodynamic processes and cycles of machines, Steams and steam cycles. Dynamic investigation of non-solid materials (fluidics):

Flows assumed to be ideal (frictionless): Compressible flows: gas dynamics, supersonic flow (Laval tube), Basic acoustic concepts, Investigation of plane flows using the method of complex potentials, flow around a stationary and rotating cylinder,

Vortex flows (consistency of momentum theorem, Helmholtz and Thomson theorems), Vortex panel method. Real flows

(frictional): Navier-Stokes equation, Reynolds averaged Navier-Stokes equation, Turbulent flows (Prandtl turbulence model,

basics of k-ω, k-ε models), Boundary layer theory (Prandtl boundary layer model, dimensionless boundary layer characteristics), Basics of numerical flow modeling. Basics of fluid mechanics: Characteristics of pipes, pipe systems (loop law, nodal law, characteristic curve), Basics of vortex pumps (structure, operation, impeller types, Euler turbine equation, gear ratio,

reaction ratio, characteristic curve, effective power).

21. Programme of practices

After each topic covered in the lecture, we will work together to solve simple but useful computational examples so that you can learn the application step by step - not only in theory, but also in practice.

22. Programme of laboratories

Gas turbine measurement. Experimental determination of the water vapor tension curve. Investigation of the heat transfer of a horizontal pipe.

Comparison of heat radiation of surfaces. Measurement of pipe friction.

Measurement of air force on a wing. Water jet pump. Measurement and calculation of flow around a cylinder (CFD).

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. understands the fundamental principles describing the energetic and dynamic behavior of non-solid materials, including various modes of heat transfer, flow theory models, and the operating principles of flow machinery. (T9,T10)

b) skills (k)

1. is able to reproduce, adapt and interpret the content of the subject in a meaningful way (K22,K26,K27,K29,K30,K32)
2. is able to communicate his/her ideas and plans clearly and visually to others (K33)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team

2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

2. makes responsible decisions in solving tasks in his/her chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Mid term test 2. Homework 1 3. Homework 2 4. Gas turbine measurement. 5. Experimental determination of the water vapor tension curve. 6. Investigation of the heat transfer of a horizontal pipe. 7. Comparison of heat radiation of surfaces. 8. Measurement of pipe friction. 9. Measurement of air force on a wing. 10. Water jet pump investigation. 11. Measurement and calculation of flow around a cylinder (CFD).	1. ZH 2. F1 3. F2 4. M1 5. M2 6. M3 7. M4 8. M5 9. M6 10. M7 11. M8	1. 35% 2. 3% 3. 3% 4. 2% 5. 1% 6. 1% 7. 1% 8. 1% 9. 1% 10. 1% 11. 1%	1. t1,k1-2,a1-2,o1-2 2. t1,k1-2,a1-2,o1-2 3. t1,k1-2,a1-2,o1-2 4. t1,k4,a1-2,o1-2 5. t1,k4,a1-2,o1-2 6. t1,k4,a1-2,o1-2 7. t1,k4,a1-2,o1-2 8. t1,k4,a1-2,o1-2 9. t1,k4,a1-2,o1-2 10. t1,k4,a1-2,o1-2 11. t1,k4,a1-2,o1-2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	t1

26. Criteria to obtain a signature / midterm grade

The conditions for having the signature at the end of the semester are: submission of homeworks on time, successful (min. 50%) completion of the midterm test, and the fulfilment of the laboratory practices and the acceptance of the report about the labs.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

One of the labs and the mid-term exam can be made up as part of a make-up.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Fundamentals of mobility**				
2. Subject name in Hungarian	Mobilitás alapjai			**3. Programme**	j
4. Subject code	**BMEKORHBSJ1001-00**			**5. Term | role**	**1 | k**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**3 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	44 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Veress Árpád		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

The aim of the course is to present the activities of companies and partner institutions active in the field of vehicle engineering and the opportunities for students placed with them. In addition, students will acquire the university-civic competences related to vehicle engineering.

20. Programme of lectures

The lectures will provide students with direct exposure to the field of vehicle engineering through guest speakers from industry partners, who will describe their jobs, what an industry partner expects from engineering students and graduates, and what career opportunities they can offer.

21. Programme of practices

-

22. Programme of laboratories

During the laboratory sessions, students will be introduced to the framework of student and university-civic life in the context of a tutorial.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the technologies and processes in mobility (T8,T10-T14)
1. is familiar with the university-civic competences

b) skills (k)

1. is able to reproduce, adapt and interpret the university-civic competences in a meaningful way
2. is able to communicate the ideas and plans about mobility clearly and visually to others (K19-K21)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team (A15)
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks (A15)

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others (O13)
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified (O13)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. in-class assignment 2. attendance on lectures	1. OF 2. JEL	1. 0% 2. 100%	1. t2,k1,a1,o1 2. t1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
successful (min. 50%) completion of the in-class assignment and the attendance criterion	Excellent 80-100% participation in the lectures Good 70-79% participation in the lectures Satisfactory 60-69% participation in the lectures Pass 50-59% participation in the lectures Fail 0-49% participation in the lectures
28. Attendance and participation requirements	
at least 50% of lectures must be visited, max. 30% of laboratory classes can be missed	
29. Retake and delayed completion	
The in-class assignment can be re-taken once in oral form.	

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

-

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Fundamentals of vehicle dynamics**				
2. Subject name in Hungarian	Járműdinamikai alapok			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ4A03-00**			**5. Term | role**	**4 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	8 hours	**Homework**	30 hours
Reading written materials	20 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Harth Péter senior lecturer	**15. Email address**	harth.peter@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Szabó Bálint, Virt Márton		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of this course is to learn the fundamentals of vehicle dynamics, to use this knowledge to understand the behaviour of different vehicle systems.

20. Programme of lectures

Introduction to vehicle dynamics, Tyre dynamics, Longitudinal dynamics, handling, vehicle vertical dynamics

21. Programme of practices

-

22. Programme of laboratories

Simple vehicle dynamical simulation and motion analysis

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basics of vehicle dynamics, knows the possibilities and measures of vehicle dynamics modeling.

b) skills (k)

1. Is able to set up simple vehicle models and perform simulations to analyse vehicle motions.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.
2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework about simulation model building and analysis 2. homework about simulation model building and analysis 3. midterm test	1. HF1 2. HF2 3. ZH1 4. ZH2	1. 20% 2. 20% 3. 30% 4. 30%	1. t1,k1,a1-a3,o1-o3 2. t1,k1,a1-a3,o1-o3 3. t1,k1,a1-a3,o1,o2 4. t1,k1,a1-a3,o1,o2

4. midterm test			

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The midterm test is passed if more than 50% of the maximum score is achieved. Attendance at labs during the semester is mandatory and submission of the homework at an acceptable level is required. A successful midterm test, completion of all labs and submission of homeworks with an acceptable grade is required to receive a passing grade.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

One midterm test can be retaken twice, homeworks can be supplemented during the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

Course bulletins available in moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Greening and flight safety**				
2. Subject name in Hungarian	Környezetvédelem és repülésbiztonság			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6B01-00**			**5. Term | role**	**6 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	27 hours	**Midterm preparation**	25 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Rohács Dániel associate professor	**15. Email address**	rohacs.daniel@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Kale Utku, Dr. Rohács Dániel		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

Aviation Safety and Environmental Awareness course is designed to provide individuals with essential knowledge and training related to aviation safety practices and the environmental impact of aviation operations. These courses are essential for students working to improve safety standards and minimise the environmental impact of aviation.

20. Programme of lectures

This lecture series covers the critical intersection of aviation safety and environmental awareness, examining how operational models, human factors, and environmental considerations shape modern aviation practices.I will explore a variety of topics related to the safety, performance, and environmental impact of aviation, emphasizing the importance of understanding both human and technological factors to ensure effective decision-making and sustainable practices.

Key Topics:

Operator Models:

Load Management: Understanding the impact of operational load on decision-making and performance.

Situation Awareness: How pilots and operators maintain awareness of both immediate and long-term conditions affecting flight safety.

Information Flow and Decision-making: Analyzing how information is processed and its role in effective decision-making in dynamic aviation environments.

Swiss Cheese Model: Understanding how system failures accumulate and how layers of safety mechanisms help to prevent accidents.

Single Pilot Operations (SPO):

Examining the increasing role of single-pilot operations in aviation and the unique challenges they pose for safety, workload management, and communication.

Communication and the Changing Role of Aviation Operators:

Exploring the evolving responsibilities of aviation operators and the importance of clear, effective communication in ensuring safety and operational efficiency.

Investigating pragmatic failures in aviation communication, including misunderstandings and misinterpretations that can lead to safety risks.

New Airspace Configurations:

Understanding how changes in airspace design and management influence aviation safety and efficiency.

Operator Stress/Load Assessment Methods:

Investigating methods to assess and measure the stress and load on aviation operators, including physiological and psychological factors that influence performance.

Exploring the latest measurement techniques and tools used to assess pilot workload and stress levels.

Virtual Reality (VR) Solutions and Smart Training:

The application of VR technology in training programs, focusing on how it can enhance safety by providing realistic, immersive scenarios for training without the risks associated with real-world flight training.

Environmental Effects of Transportation:

Air Pollution: Investigating the role of aviation in contributing to air pollution and examining strategies for reducing emissions.

Noise Pollution: Analyzing the environmental impact of aviation noise, particularly near airports, and exploring potential mitigation strategies.

Land Degradation: Understanding the indirect impacts of aviation on land use and development, particularly around airports.

Environmental Sustainability in Aviation:

Energy Efficiency: Examining methods to improve energy use within the aviation sector, including the adoption of more fuel-efficient technologies and aircraft.

Alternative Fuels: A look at the potential of alternative fuels (e.g., biofuels, hydrogen) to reduce aviation's carbon footprint.

Clean Technologies: Investigating innovations in aviation technology that aim to reduce harmful emissions and improve overall environmental sustainability.

Strategies for Reducing Aviation’s Carbon Footprint:

Policy Measures: Exploring current and future policy frameworks designed to reduce the environmental impact of aviation, such as emissions trading schemes, carbon offsets, and regulatory initiatives.

Technological Innovations: Identifying key innovations, such as electric or hybrid aircraft, that have the potential to drastically reduce aviation’s carbon emissions.

Behavioral Change: Understanding how changing operator behaviors, industry practices, and public attitudes toward aviation can contribute to environmental sustainability.

21. Programme of practices

In the Aviation Safety and Environmental Awareness lecture, the practical session will involve the examination of real-world aircraft incident and accident videos, accompanied by a detailed PowerPoint presentation. During this session, we will analyze the major and contributory causes of each accident and incident, fostering a deeper understanding of aviation safety challenges.

The primary goal of this practical part is to engage students in an interactive discussion on these real-world cases, allowing them to apply the theoretical knowledge gained from previous lectures. Through analyzing video footage and discussing the incidents in-depth, students will gain insights into how safety protocols, human factors, operational models, and environmental considerations contribute to aviation safety and risk management.

Key activities during the practical session will include:

Video Analysis: Watching and analyzing aircraft incident and accident videos to identify critical safety issues.

Root Cause Investigation: Investigating both major and contributory factors involved in each incident, such as pilot errors, system failures, communication breakdowns, and environmental factors.

Group Discussion: Encouraging students to discuss potential safety improvements and preventive measures based on the incident findings.

Harmonizing Theory with Practice: Connecting theoretical concepts from previous lectures (e.g., operator models, situation awareness, decision-making, etc.) with real-world examples to reinforce learning.

Safety Recommendations: Students will work collaboratively to develop safety recommendations and mitigation strategies that could prevent similar accidents from occurring in the future.

This interactive practical session will allow students to better understand the complexities of aviation safety, the role of human and environmental factors, and the importance of continuous learning and improvement in the aviation industry.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme’s learning outcomes (upper case)

The student

a) knowledge (t)

1. is familiar with national and international aviation regulations, compliance and guidelines to ensure the safety, quality, and environmental standards of aircraft and operations.

2. is familiar with the specific knowledge needed for safe operation of aviation-related vehicles, ensuring efficiency and safety.

3. knows the operating principles and structural components of aircraft, focusing on safety, functionality, and environmental impact.

b) skills (k)

1. uses systematic processes to analyze aviation incidents and environmental data, helping development of new insights and improved practices for enhancing safety and sustainability in aviation operations.

2. is able to use mathematical principles in evaluating aviation safety data, environmental impacts, and risk assessments, ensuring appropriate interpretation of key data related to safety and environmental standards.

3. utilizes digital technologies, such as simulation tools and data analysis software, to communicate and present their findings on aviation safety and environmental awareness effectively.

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team

2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 100%	1. t1-t3,k1-k3,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

at a time and
in a form agreed
with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Heat engines and fluid machines 1.**				
2. Subject name in Hungarian	Járművek hő- és áramlástechnikai berendezései 1.			**3. Programme**	j
4. Subject code	**BMEKORHBSJ5001-00**			**5. Term | role**	**5 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	28 hours	**Homework**	0 hours
Reading written materials	10 hours	**Midterm preparation**	0 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Simongáti Győző		
18. Indicative prerequisites	BMEKORHBSJ4001-00 Hő- és áramlástan 2. recommended core, BMEKORHBSM1001-00 Mérnöki alapismeretek recommended complementary, Matematka A3j recommended complementary		

19. Purpose

Classification of fluid machinery and heat engines, principles and characteristics, their function by means of vehicle engineering.

20. Programme of lectures

Overview and characterisation of positive displacement compressors and their application in vehicles. Mode of operation, types, construction, control, calculation options, sizing and selection criteria.

Dynamic compressors and Turbines: Fundamentals: basic equations, head, efficiency, velocity triangles, Euler turbine equation, reaction factor, characteristic curves. Equivalence numbers and their application. Detailed discussion of radial machines (compressor and turbine). Detailed discussion of axial machines (compressor and turbine). Characteristic curves and control of fluid machines.

Basic parameters, performance data, characteristics and curves of piston engines.

Comparison of gas turbines and reciprocating engines. Description, operation, construction, theoretical and practical aspects of each type of gas turbine; ideal and real processes and optimum characteristics. Possibilities for increasing the efficiency of gas turbine engines (heat exchanger, working fluid recooling, heat input per unit, combined cycle). Basic principles of jet engine operation, propulsion efficiency and thrust.

Turbochargers.

21. Programme of practices

-

22. Programme of laboratories

Centrifugal compressor map, Single stage air turbine, Operational characteristics of gas turbine and turbocharger, Piston compressor characteristics

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. will be familiar with the theoretical aspects of the topics covered in the course description and related to thermal and electrical machines and equipment, as well as the practical aspects based on laboratory measurements and analytical calculations, with particular emphasis on automotive applications, knows the advantages and disadvantages, validity criteria and fields of application of the various methods, the relevant literature, knows where to find more detailed information for each field of specialisation in order to carry out the task. (T9,T10)

b) skills (k)

1. be able to distinguish between different types of machines operating on and within different principles (K22,K23)
2. be able to select the appropriate equipment for a given task (K22,K23)
3. can compare different types of machines (K22,K23,K27,K32)

4. can communicate ideas and plans clearly to others (K27,K33)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team (A16)

2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical of the tasks assigned (A16)

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others (O16)

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified (O14)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1: Centrifugal compressor map 2: Single stage air turbine 3: Operational characteristics of gas turbine and turbocharger 4: Piston compressor characteristics	1. M1 2. M2 3. M3 4. M4	1. 0% 2. 0% 3. 0% 4. 0%	1. t1,k4,a1-2,o1-2 2. t1,k4,a1-2,o1-2 3. t1,k4,a1-2,o1-2 4. t1,k4,a1-2,o1-2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 100%	1. t1

26. Criteria to obtain a signature / midterm grade

The conditions for having the signature at the end of the semester are the fulfilment of the laboratory practices and the acceptance of the report about the labs

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one lab exercise

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

1. Beneda, K., Simongáti, Gy., and Veress, A., 2012, Járművek hő- és áramlástechnikai berendezései I. (Fluid- and Turbomachinery in Vehicles I (lecture note at BME)), ISBN 978-963-279-639-0, 1st ed., Budapest, Publisher: “Typotex Kiadó”.
2. Other materials about the lectures (Power Point or *.pdf documentations), guide lines and tutorials provided by the professors.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Heat engines and fluid machines 2.**				
2. Subject name in Hungarian	Járművek hő- és áramlástechnikai berendezései 2.			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6001-00**			**5. Term | role**	**6 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	28 hours	**Homework**	0 hours
Reading written materials	10 hours	**Midterm preparation**	0 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Hargitai L. Csaba senior lecturer	**15. Email address**	hargitai.laszlo.csaba@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba		
18. Indicative prerequisites	BMEKORHBSJ4001-00 Hő- és áramlástan 2. recommended core, BMEKORHBSM1001-00 Mérnöki alapismeretek recommended complementary, Matematka A3j recommended complementary		

19. Purpose

Classification of fluid machinery and heat engines, principles and characteristics, their function by means of vehicle engineering.

20. Programme of lectures

Overview, description and application in vehicles of the machines listed below. For all machines: Mode of operation, types, structure, control, calculation possibilities, dimensioning-selection aspects, determination of working point.

Fans. Noise calculation.

Pumps. Selection, dimensioning, non-cavitation operation.

Heat exchangers.

Air conditioners for vehicles.

Refrigerators, heat exchangers. Working fluids for refrigerators and heat exchangers.

21. Programme of practices

-

22. Programme of laboratories

Measurement of the operating conditions of a refrigerator. Measurement of the characteristic curve of a centrifugal pump. Measurement of the characteristic curve of a gear pump. Measurement of the operating conditions of a water-water heat exchanger.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. will be familiar with the theoretical aspects of the topics covered in the course description and related to thermal and electrical machines and equipment, as well as the practical aspects based on laboratory measurements and analytical calculations, with particular emphasis on automotive applications, knows the advantages and disadvantages, validity criteria and fields of application of the various methods, the relevant literature, knows where to find more detailed information for each field of specialisation in order to carry out the task. (T9,T10)

b) skills (k)

1. be able to distinguish between different types of machines operating on and within different principles (K22,K23)
2. be able to select the appropriate equipment for a given task (K22,K23)
3. can compare different types of machines (K22,K23,K27,K32)
4. can communicate ideas and plans clearly to others (K27,K33)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team (A16)

2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical of the tasks assigned (A16)

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others (O16)

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified (O14)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Measurement of the operating conditions of a refrigerator. 2. Measurement of the characteristic curve of a centrifugal pump. 3. Measurement of the characteristic curve of a gear pump. 4. Measurement of the operating conditions of a water-water heat exchanger.	1. M1 2. M2 3. M3 4. M4	1. 0% 2. 0% 3. 0% 4. 0%	1. t1,k4,a1-2,o1-2 2. t1,k4,a1-2,o1-2 3. t1,k4,a1-2,o1-2 4. t1,k4,a1-2,o1-2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 100%	1. t1

26. Criteria to obtain a signature / midterm grade

The conditions for having the signature at the end of the semester are the fulfilment of the laboratory practices and the acceptance of the report about the labs

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one lab exercise

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

1. Dr. Gausz Tamás, Hargitai L. Csaba, Dr. Simongáti Győző, 2011, Járművek hő- és áramlástechnikai berendezései II. (Fluid- and Turbomachinery in Vehicles II (lecture note at BME)), ISBN 978-963-279-640-6, 1st ed., Budapest, Publisher: “Typotex Kiadó”.
2. Other materials about the lectures (Power Point or *.pdf documentations), guide lines and tutorials provided by the professors.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Machine learning**				
2. Subject name in Hungarian	Gépi tanulás			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ6C01-00**			**5. Term | role**	**6 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**0 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	22 hours	**Homework**	30 hours
Reading written materials	10 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Bécsi Tamás associate professor	**15. Email address**	becsi.tamas@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Bécsi Tamás		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the course is to enable students to acquire practical skills in understanding, developing, and applying machine learning algorithms through real-world problem solving.

20. Programme of lectures

-

21. Programme of practices

Throughout the course, students develop machine learning models in a Python environment (e.g. Scikit-learn, TensorFlow, PyTorch) using both structured and unstructured data. The training follows the complete machine learning workflow step by step: data preprocessing, feature selection, model selection, training, evaluation, and fine-tuning. During the lab sessions, students implement supervised and unsupervised algorithms and test their performance in realistic scenarios such as classification, prediction, and clustering.

The goal is not only to understand how algorithms work, but to be able to apply them to novel, unseen datasets and critically evaluate the results. Throughout the semester, students carry out smaller individual and group projects, develop their own models, experiment with hyperparameters, and gain experience in identifying and handling practical challenges in machine learning.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Recognizes and understands the different groups of machine learning algorithms (supervised, unsupervised, reinforcement learning).
2. Describes and defines the steps of data preparation, model selection, and evaluation in the machine learning process.

b) skills (k)

1. Apply basic machine learning algorithms on structured and unstructured data.
2. Implement and test machine learning models, then evaluate their performance based on real-world scenarios.

c) attitude (a)

1. Is open to trying new algorithms, tools, and learning methods, and is committed to data-driven thinking.

d) autonomy and responsibility (o)

1. Independently formulates solution proposals for new data analysis problems and creatively directs his/her own learning process.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. Homework	1. HF	1. 100%	1. t1,t2,k1,k2,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

To obtain a mid-year pass, homework must be accepted.

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

The homework can be submitted during the delayed completion week.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Practical slides and digital data

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Maintenance and reparation of railway vehicles**				
2. Subject name in Hungarian	Vasúti járművek karbantartása és javítása			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ6F02-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	16 hours
Reading written materials	28 hours	**Midterm preparation**	12 hours	**Exam preparation**	12 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Ferencz Péter		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

To introduce future railway vehicle engineers to railway vehicle maintenance strategies, maintenance systems, processes and activities related to maintenance, repair and production.

20. Programme of lectures

The life cycle of railway vehicles, its characteristic milestones from operator tendering to scrapping and recycling. Railway vehicle operation and maintenance systems: philosophy, strategy, operational processes, theoretical foundations for the development of maintenance schedules. Service processes, locations, premises, support and service processes of vehicle operation, diagnostic stations, maintenance, repair and refurbishment. General technological processes of railway vehicle repair. Repair technological characteristics of main parts, components: technology of the frame structure, chassis and mechanical equipment (drive and brake system) elements. Operational fault detection tools for traction, towed, motorised and electric vehicles. Design of repair processes, the market environment of railway vehicle maintenance and repair, parameters influencing its possible strategy, past, present and future.

21. Programme of practices

Application of knowledge learnt on lectures by practical tasks. Preparation of project task.

22. Programme of laboratories

We perform laboratory measurements in the workshops of industrial partners. These include bogie load testing, wheel diameter, wheel profile, axle pin diameter, and inner dimension measurements. Carrying spring characteristics recording. Microscopic examination practice.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the main stages of the life cycle of a railway vehicle in terms of maintenance and repair.
2. knows the systems of operation and maintenance of railway vehicles, their philosophies and basic characteristics.
3. knows the technologies applicable during the maintenance and repair of railway vehicles.
4. knows the technologies applicable both in terms of main parts of railway vehicles and components.
5. knows the fault finding methods and procedures applied during the maintenance and repair of railway vehicles.

b) skills (k)

1. is able to recognize the maintenance and repair needs of railway vehicles.
2. is able to select the appropriate maintenance or repair technology for individual railway vehicle units.
3. is able to select and apply a fault finding method for railway vehicles.

c) attitude (a)

1. is interested in learning more about technical issues related to the repair and maintenance of railway vehicles.
2. is independently interested in new technical solutions in the field.

d) autonomy and responsibility (o)

1. expresses an independent opinion on issues related to the maintenance and repair of railway vehicles
2. takes responsibility for the adequacy of the procedures he applies.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework - essay-style compilation of a chosen topic 2. 10-minute presentation of a chosen topic and preparation of a presentation slide set 3. lab measurement reports (3 pcs)	1. F1 2. F2 3. F3	1. 20% 2. 20% 3. 10%	1. t4,a1,a2,o1 2. t5,a1,a2,o2 3. t6,k3,a1,a2,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. V	1. 50%	1. t1-t3,t7,k1,k2,o1,o2

26. Criteria to obtain a signature / midterm grade

Submission of the assignments by the deadline or on the lessons.

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

One of the mid-term requirements can be made up in the framework of repeated replacement.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

30. Consultation

At a time and in a form agreed with the teacher

31. Learning materials

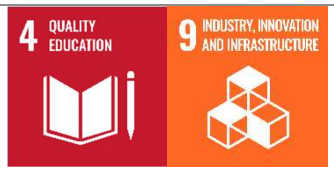
Presentation slides. Lecture slides. Departmental aids, lecture outlines.
Conference presentation materials.
International trade fair documents.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Maintenance, repair and modernisation**				
2. Subject name in Hungarian	Karbantartás, javítás és modernizáció			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6002-00**			**5. Term | role**	**6 | k**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	27 hours	**Midterm preparation**	25 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Bán Krisztián, Faltin Zsolt, Dr. Markovits Tamás, Dr. Veress Árpád		
18. Indicative prerequisites	BMEKOGJBSJ3001-00 Gyártástechnológia recommended core, - - -, - - -		

19. Purpose

The aim of the course is to familiarize students with the various maintenance and repair technologies, technological methods and strategies used in railway and road vehicles, as well as in aviation industry. In addition, students will encounter current technical problems and their solutions through various case studies.

20. Programme of lectures

Maintenance systems, methods, strategies (condition monitoring, inspection systems), Failure phenomena, Detection methods, Repair methods, Failure and repair of specific components, parts (case studies), Tribology, lubrication systems, Wear, corrosion, cracking, Surface restoration techniques.

21. Programme of practices

-

22. Programme of laboratories

In the lab, maintenance and repair examples are presented through case studies from different fields.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the vehicle maintenance, repair and modernization technologies and processes (T1,T9,T10,T15)

b) skills (k)

1. is able to reproduce, adapt and interpret the elements and devices of vehicle maintenance and repair in a meaningful way (K23-K26,K34)
2. is able to communicate the ideas and plans about vehicle modernization clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team (A16)
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others (O14)
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. midterm test	1. ZH	1. 100%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 90-100%
Good 76-89%
Satisfactory 63-75%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

with the teacher at a previously agreed time and form

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Management and business economics**				
2. Subject name in Hungarian	Menedzsment és vállalkozás gazdaságtan			**3. Programme**	jkl
4. Subject code	**BMEKOKKBSM5001-00**			**5. Term | role**	**5 | k**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**3 lecture**	**0 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	20 hours	**Homework**	0 hours
Reading written materials	28 hours	**Midterm preparation**	30 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Transport Technology and Economics		
14. Subject coordinator and its position	Dr. Kővári Botond associate professor	**15. Email address**	kovari.botond@kjk.bme.hu
16. …organisational unit	Department of Transport Technology and Economics		
17. Instructor(s)	Dr. Kővári Botond		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

To familiarize students with the basic operations, economic, marketing and human resources tasks of companies, and to prepare them to perform managerial tasks in companies.

20. Programme of lectures

General overview of companies, its environment, and company forms. Types of companies, foundation in the practise. Liquidation of the companies. Competition regulation. Features of a market. Company resources, processes. Evaluation of resources. Productivity indicators, correlations. Cost definitions, correlations. Human resource management. Basic tax knowledge. Innovation and its process. Management aspects of the transportation modes.

21. Programme of practices

-

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the customer and market needs of companies' products (K,L:T2)
2. knows the costs incurred during production and the provision of services, their groups (K,L:T5)
3. is able to apply communication techniques in business life appropriately (K:T11)
4. is able to evaluate and determine the position of the market and companies, and set relevant goals (K:T15)
5. is able to evaluate basic data and information related to the market and the operation of the company (K:T9,T12;L:T9)

b) skills (k)

1. analyzes market needs, manages customers, performs marketing tasks (K,L:K1,K2,K5)
2. effectively manages company processes, controls costs (K:K3,K8,K30;L:K33)
3. uses communication with competitors and partners, supports decisions with economic studies (K:K7,K9,K12,K31;L:K34,S1)
4. analyzes alternative decisions, the offered portfolio, economic factors related to production (K:K16,K19,K21)
5. examines market conditions, characteristics, is able to plan the delivery of products (K:K20,K26,K29;L:K20,K32)

c) attitude (a)

1. strives to the best of his/her abilities to solve complex economic tasks (K,L:A1,A2,A4,A5,A11,A12)
2. strives to solve complex problems in his/her work, always taking into account multiple aspects (K,L:A7,A8,A9,A13;K:A14,A15,A18,A22)

d) autonomy and responsibility (o)

1. is able to solve economic and marketing problems independently or as part of a team to a high standard (K,L:O4,O5,O6,O10)
2. feels responsible for the results and quality of his work (K,L:O7,O8,O11;K:O18)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1-t5,k1-k5,a1,a2,o1,o2 2. t1-t5,k1-k5,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Chikán, Attila: Vállalatgazdaságtan (in Hungarian)
Philip Kotler: Marketing management

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Manufacturing**				
2. Subject name in Hungarian	Gyártástechnológia			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ3001-00**			**5. Term | role**	**3 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	16 hours	**Exam preparation**	16 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Markovits Tamás associate professor	**15. Email address**	markovits.tamas@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Pál Zoltán, Dr. Takács János, Dr. Markovits Tamás, Dr. Varga Ferenc László		
18. Indicative prerequisites	BMEKOGJBSJ2001-00 Anyagismeret és anyagtechnológia recommended core, - - -, - - -		

19. Purpose

Introduction to the basic phenomena, main process types and main characteristics of cutting processes used in vehicle manufacturing.

20. Programme of lectures

In connection with cutting in vehicle manufacturing, the basic phenomena of cutting, machining with definite and indefinite edge geometry and its main characteristics are presented (Turning, drilling, planing, chiseling, milling, boring, thread machining, grinding and fine surface machining.) Typical vehicle component manufacturing technologies are described. Various aspects of correct manufacturing design and the main measurement methods used in manufacturing technology are presented.

21. Programme of practices

During the practice, various cutting equipment, tool edge geometry, main steps of technological design, and traditional and coordinate measurement techniques help to better understand the theoretical material.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the basic characteristics of cutting processes, knows the main procedures, tools, movement conditions and main application cases. (T9,T10)
2. Knows the manufacturing accuracy relationships of the construction. (T1,T15)
3. Knows the main measurement techniques necessary for the qualification of machined parts. (T10,T15)

b) skills (k)

1. Is able to take into account production aspects based on the procedures and methods described, apply them where appropriate, and further deepen the production knowledge based on this. (K15,K23,K24,K27,K28,K30,K34,K41)

c) attitude (a)

1. Is open to new opportunities and solutions in the field.

d) autonomy and responsibility (o)

1. Participates responsibly in tasks and processes. (O14,O15)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 15%	1. t1-t3,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. Vizsg1	1. 85%	1. t1-t3,k1,a1,o1

26. Criteria to obtain a signature / midterm grade

During the semester 1 midterm test has to be completed with more the 50 % of the maximal points. In the semester participation in labs is mandatory. The condition of the signature is the correspondingly qualified midterm exam, fulfilment of all lab activities.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm test can be retaken twice.

30. Consultation

Every lecture

31. Learning materials

Course bulletins available in moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Manufacturing automation and digitalization**				
2. Subject name in Hungarian	Gyártásautomatizálás és digitalizáció			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6D01-00**			**5. Term | role**	**6 | sp**
6. Credits	**9**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**270 hours**
Contact hours	84 hours	**Preparation for lessons**	30 hours	**Homework**	60 hours
Reading written materials	26 hours	**Midterm preparation**	40 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Hlinka József senior lecturer	**15. Email address**	hlinka.jozsef@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Takács János, Dr. Markovits Tamás, Dr.Hlinka József, Dr. Herczeg Szabolcs, Dr. Bánlaki Pál		

18. Indicative prerequisites

BMEKOGJBSJ3001-00 Gyártástechnológia recommended core,
BMEKOGJBSJ4D01-00 Járműanyagok recommended core,
BMEKOGJBSJ4D02-00 Járműgyártás folyamatai 1. recommended core

19. Purpose

The Course objective is to provide knowledge about the principles and history of manufacturing automation, tools for flexible manufacturing, the operating principles of NC and CNC machines, the functioning of control and regulation systems, and the integration of units into systems. Linking 3D coordinate measurement technology with automated manufacturing. Overview of surface digitization methods. Introduction to PLC controls and programming. Exploring CAD/CAM integration and additive manufacturing possibilities. Metrology (integration into manufacturing) and tool monitoring. The role of robots in integrated manufacturing. Presentation of Industry 4.0 opportunities.

20. Programme of lectures

Manufacturing automation systems and components, Sensors, Actuators, CNC, PLC, Robotics, Reverse engineering, Rapid prototyping, Industry 4.0, Digital twin

21. Programme of practices

Robot Programming Practicum, PLC Programming Practicum, CNC Programming Practicum

22. Programme of laboratories

Robot Lab, PLC Lab, CNC Lab, Surface Digitization Lab

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the automated manufacturing tools and solutions.
2. Understands the Industry 4.0 concepts.
3. Is familiar with additive manufacturing technologies, as well as PLC, CNC, and robotics systems.

b) skills (k)

1. Is able to apply the knowledge elements of automated manufacturing tools and capabilities, Industry 4.0, additive manufacturing technologies, PLC, CNC and robotics and related professional skills to solve problems in the field of automated manufacturing systems.

c) attitude (a)

1. Strives for a deeper understanding of the curriculum, and find relationships among the different topics.
2. Strives to interpret independently what has been said in lectures, practices and laboratory (relationships, statements, diagrams), to be open to thinking together with the instructor and his / her students.
3. Strives for active participation in lectures, practices and laboratory.

d) autonomy and responsibility (o)

1. Accepts the frameworks for completing the subject, and performs its tasks independently and responsibly, in accordance with ethical norms.

2. Apply responsibly the knowledge acquired during the course with regard to their validity limits.
3. The completed measurement tasks are carried out independently or together with other students, in accordance with the specified conditions and ethical norms.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. mindterm exam 2. homework 1 3. homework 2	1. ZH 2. HF1 3. HF2	1. 20% 2. 15% 3. 15%	1. t1-t3,k1,a1-a3,o1,o2 2. t1-t3,k1,a1-a3,o1,o2 3. t1-t3,k1,a1-a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Oral exam	1. Vizsg1	1. 50%	1. t1-t3,k1,a1-a3,o1,o2

26. Criteria to obtain a signature / midterm grade

During the semester 1 midterm test has to be completed with more the 50 % of the maximal points. In the semester participation in labs is mandatory and the planning task is required to be delivered to an acceptable level. The condition of the signature is the correspondingly qualified midterm exam, fulfilment of all lab activities and homeworks' submission.

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm test can be retaken twice, homeworks can be supplemented during the delayed completion week.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

30. Consultation

Every lecture

31. Learning materials

Balla S., Bánlaki P., Göndöcs B., Haidegger G., Markovits T., Pál Z., Takács J., Weltsch Z.: Production automation (in Hungarian), Typotex Kiadó, 2012.
Horváth M., Markos S.: Machine production technology (in Hungarian), Műegyetemi Kiadó 45018, Budapest,1995, p.520
Erdélyi F., Hajdú Gy., Tóth T.: Automatization of machine production (in Hungarian). Gépgyártástechnológia, (XXX. évf. 10. sz.), 1990. okt. pp.: 451-470
Takács J.(szerk.): Advanced technologies in shaping surface properties (in Hungarian), Műegyetemi Kiadó, Budapest, 2004, p.: 346. ISBN 963 420 789 8
Ászity Sándor, Dömötör Ferenc: Industry 4.0 (in Hungarian), Akadémia Kiadó, 2018

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Material science and technology**				
2. Subject name in Hungarian	Anyagismeret és anyagtechnológia			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ2001-00**			**5. Term | role**	**2 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**4 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	8 hours	**Homework**	0 hours
Reading written materials	30 hours	**Midterm preparation**	28 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Bán Krisztián associate professor	**15. Email address**	ban.krisztian@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Buza Gábor, Dr. Bán Krisztián, Dr. Markovits Tamás, Dr. Dömötör Ferenc, Dr. Bánlaki Pál, Dr. Pál Zoltán, Dr. Hlinka József, Dr. Vehovszky Balázs, Dr. Katona Géza, Dr. Varga Ferenc László, Bereczki Alexandra, Erőss László, Szabados Gergely, Székely György		
18. Indicative prerequisites	BMEVEKTAKO1 Műszaki kémia recommended complementary, - - -, - - -		

19. Purpose

The objective of the course is to provide students with adequate basic knowledge of structural materials and materials technology processes used in the automotive industry. This knowledge should offer a sufficient basis for their further studies and engineering work.

20. Programme of lectures

In the field of material science, topics are focused on the structure and properties of metallic materials and their testing methods applied in the vehicle industry. The main topics: ideal and real crystalline structure, thermodynamics, binary phase diagrams (phase transformations), the phase diagram of the Fe-C system, metallographic structure, non-equilibrium transformations in steels, non-ferrous alloys, destructive and non-destructive testing of materials. The subject gives knowledge about the types, properties, heat treatments and comparisons of structural metallic materials for the vehicle industry (steel, cast iron, light and non-ferrous metals), characteristics and processing of plastics and composite materials. Further areas include the main processes and characteristics of casting, plastic deformation technologies, sheet metal forming, powder metallurgy and coating. Students gain insight into the most important joining technologies used in vehicle manufacturing: welding, soldering, gluing and mechanical joints.

21. Programme of practices

Students acquire more practical knowledge in the field of optical microstructural analysis of alloys (metallography), reading and interpretation of binary phase diagrams, respectively the microstructural characteristics of structural materials. We introduce and demonstrate the main non-destructive testing methods for material defects. They are introduced to the practical knowledge of the system of steel grades, standards and signing. They solve simple material selection problems. Students carry out simple technological calculations related to sheet metal forming. We demonstrate the main welding technologies used in the vehicle industry.

22. Programme of laboratories

Students carry out an optical microstructural and grain structure analysis of alloys (metallography), and the most important mechanical testing. We introduce them into the non-equilibrium transformation of steels and carry out heat treatment tests. Students acquire the preparation of test result documentation based on measurement data.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knowledge of the characteristics of chemical bondings.
2. Knowledge of the description method of the crystal lattice, the types of lattice defects.
3. Knowledge of the basic concepts of thermodynamics.
4. Knowledge of the process and kinetics of crystallization of the metals.
5. Knowledge of the role, types, key ideas and important phase reactions of the equilibrium phase diagrams of biner systems with special regard to stable and metastable Fe-C systems. Knowledge of the most important concepts and elements of microstructure.

6. Knowledge of the concept of non-equilibrium transformations, non-equilibrium phase diagrams of steels.
7. Knowledge of the most important types of alloys in non-iron based systems.
8. Knowledge of the processes of diffusion.
9. Knowledge of the most important methods of structural analysis, destructive and non-destructive testing.
10. Familiar with the types, characteristics of vehicle construction materials and the main technologies that influence their properties.
11. Knows the technologies of forming processes, sheet forming, casting, powder metallurgy and coating procedures.
12. Familiar with welding, soldering, adhesive bonding and mechanical joining technologies.
13. Knows national and international requirements, regulations and guidelines to ensure that products, services and processes are of good quality and fit for purpose. (T2)
14. Knows the general and specific mathematical, natural and social science principles, rules, relationships and procedures necessary for the development of the vehicle and mobile machinery field. (T9)
15. Knows the conceptual system and problem-solving methods of the vehicle and mobile machinery field. (T10)

b) skills (k)

1. Able to read two-component equilibrium phase diagrams.
2. Able to read the non-equilibrium transformation diagrams of steels.
3. Able to process the data of measurement, to define the most important material characteristics and to record it in a measurement report according to the professional rules.
4. Able to select raw material on the basis of the determined criteria, understand the relationship between vehicle construction materials and production technologies.
5. Able to interpret signing of a material grade.
6. Able to perform technological calculations for sheet metal forming.
7. Able to choose joining technologies.
8. Can participate in material selection, joining technology tasks.
9. Suitable for conducting quality assessment related examinations and tests. (K15)
10. Able to understand and use specialist literature, computer science and library resources specific to vehicles and mobile machinery. (K28)

c) attitude (a)

1. Strives for a deeper understanding of the curriculum, and find relationships among the different topics.
2. Strives to interpret independently what has been said in lectures, practices and laboratory (relationships, statements, diagrams), to be open to thinking together with the instructor and his / her students.
3. Strives for active participation in lectures, practices and laboratory.

d) autonomy and responsibility (o)

1. Accepts the frameworks for completing the subject, and performs its tasks independently and responsibly, in accordance with ethical norms.
2. Apply responsibly the knowledge acquired during the course with regard to their validity limits.
3. The completed measurement tasks are carried out independently or together with other students, in accordance with the specified conditions and ethical norms.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test	1. ZH	1. 15%	1. t1-t12,k1,k2,k4-k10,a1-a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. IRV	1. 85%	1. t1-t16,k1-k10,a1-a3,o1-o3

26. Criteria to obtain a signature / midterm grade

During the semester students have to pass the midterm exam with a result of 50% of the maximum points. The participation in practices and labs is compulsory. The conditions for obtaining the signature are completing the midterm test, taking part in all the practices and labs.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm test can be retaken once during the study period, and once during the delayed completion week. Practices and labs can be completed during the semester till the limit of participants. One of the practices or labs can be completed during the delayed completion week.

30. Consultation

We provide an opportunity for consultation before the mid-term assessment, and if required, we hold a consultation during the exam period.

31. Learning materials

Charles Kittel: Introduction to solid state physics, John Wiley and Sons, 2005.

Thornton, Calangelo: Fundamentals of engineering materials, Prentice-Hall, Inc. New Jersey, 1985,
Flinn, Trojan: Engineering Materials and Their Applications
Serope Kalpakjian, Steven R. Schmid: Manufacturing processes for engineering materials, 6th ed., Upper Saddle River, N.J. : Pearson Education, 2007.
Auxiliary materials and ppt's downloadable from the Moodle

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Materials of vehicles**				
2. Subject name in Hungarian	Járműanyagok			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ4D01-00**			**5. Term | role**	**4 | sp**
6. Credits	**6**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	8 hours	**Homework**	40 hours
Reading written materials	34 hours	**Midterm preparation**	28 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Bán Krisztián associate professor	**15. Email address**	ban.krisztian@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Bán Krisztián, Dr. Hlinka József, Dr. Vehovszky Balázs, Bereczki Alexandra		
18. Indicative prerequisites	BMEKOGJBSJ2001-00 Anyagismeret és anyagtechnológia recommended core, - - -, - - -		

19. Purpose

The aim of the course is to provide more comprehensive knowledge about advanced structural and functional materials respectively material technologies used in vehicle manufacturing to automotive engineering students specializing in manufacturing technology.

20. Programme of lectures

The lectures provide knowledge for the appropriate in-depth study of vehicle materials, bulk and surface property modifications, and for understanding their modern instrumental testing.

Topics cover:

- thermodynamic fundamentals of solid-state,
- phase transformations in solid-state and their thermodynamics,
- non-equilibrium transformations,
- possibilities of strength enhance,
- metal-gas systems,
- fundamentals of surface thermodynamics,
- purpose, types and methods of surface modifications,

Advanced materials in the vehicle industry, properties and their modifications:

- advanced high strength steels, Al-based, Mg-based and Cu-based alloys, high-performance alloys,
- ferromagnetic materials,
- composite materials and structures,
- properties and processing of polimers,
- types of advanced ceramics, their properties and production.

21. Programme of practices

The exercises are intended to deepen the topics of the lectures by interpreting practical examples (measurement results, data tables, technologies, etc.). Elaboration of professional literature and personal consultation connected with the individual task of students.

22. Programme of laboratories

Material testing with advanced devices: methods of spectrometry, micro-hardness testing. Quality assurance in material processes: the practical investigation of alloy and advanced ceramic parts production. Main questions of quality assurance in raw material production.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the characteristics of metallic bonding and its role in the properties of metallic systems.
2. Knows how the phase relationships, which can be read from the phase diagram, affect the properties.

3. Knows the concept and types of metastability.
4. Knows the mechanisms of strength enhancement.
5. Knows the types and properties of structural alloys applied in the vehicle industry: advanced high strength steels, lightweight metals.
6. Knows the main properties of ferromagnetic materials.
7. Knows the phase conditions are formed in metal-gas systems.
8. Knows the concept of surface modification, main purposes and procedures.
9. Knows the types and properties of non-metallic structural material applied in the vehicle industry: polimers, ceramics, composites.

b) skills (k)

1. Is able to analyze the results of a material testing from the point of view its advantages and limits.
2. Is able to analyze and interpret a diagram.
3. Is able to collect professional literature on a specific topic and compile a summary based on it.

c) attitude (a)

1. Strives to find relationships between the different topics.
2. Strives to interpret independently the curriculum of lectures and practices, to be open to thinking together with the instructor and his / her students.
3. Strives for active participation in lectures and practices.

d) autonomy and responsibility (o)

1. Accepts the frameworks for completing the subject, and performs its tasks independently and responsibly, in accordance with ethical norms.
2. Applies responsibly the knowledge acquired during the course with regard to their validity limits.
3. Performs tasks independently, according to the designated conditions and ethical norms.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Midterm test 3. Student assignment	1. ZH1 2. ZH2 3. HF	1. 30% 2. 30% 3. 40%	1. t1-t5,k1-k2 2. t6-t9,k1-k2 3. k1-k3,o1-o3

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Students prepare a literature research about a topic agreed with the lecturer, from which they have to prepare a written summaries and hand in to the end of the semester, or perform a subtask of the research project of the department. During the semester, we have two midterm exams for which the students will be awarded. The condition of successful completion of the semester is on passing two tests and completing the assignment.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

Both midterm tests can be substituted twice, the supplementation of the written work is possible during the delayed completion week.

30. Consultation

We provide an opportunity for consultation before the two mid-term assessments or for consultation of student assignments based on individual appointment arrangements.

31. Learning materials

Charles Kittel: Introduction to solid state physics, John Wiley and Sons, 2005.
Thornton, Calangelo: Fundamentals of engineering materials, Prentice-Hall, Inc. New Jersey, 1985,
Flinn, Trojan: Engineering Materials and Their Applications, Jaico Publishing House (June 15, 2005)
Auxiliary materials and ppt's downloadable from the Moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Mathematics A1a**				
2. Subject name in Hungarian	Matematika A1a - Analízis			**3. Programme**	jkl
4. Subject code	**BMETE90AX00**			**5. Term | role**	**1 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**4 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	34 hours	**Homework**	0 hours
Reading written materials	6 hours	**Midterm preparation**	24 hours	**Exam preparation**	32 hours

13. Organisational unit in charge	Department of Stochastics (TTK)		
14. Subject coordinator and its position	Bodrogné Dr. Réffy Júlia Anna senior lecturer	**15. Email address**	reffyj@math.bme.hu
16. …organisational unit	Department of Analysis and Operations Research (TTK)		
17. Instructor(s)	Dr. Sándor Csaba, Dr. Mikovszki Tamás		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Students will learn the basics of mathematics and the fundamental mathematical concepts needed for technical thinking. In addition to this, students will develop their problem-solving skills and develop a commitment to precise, demanding engineering work through practical tasks.

20. Programme of lectures

Students will learn the basics of mathematics: the use of complex numbers, differential calculus of univariate real functions, integral calculus, the analytic geometry of three-dimensional Euclidean space.

21. Programme of practices

Students will learn the basic mathematical concepts necessary for technical thinking: the use of complex numbers, differential calculus of univariate real functions, integral calculus, analytic geometry of three-dimensional Euclidean space. In addition to this, students will develop their problem-solving skills and, through practice-oriented tasks, will develop a commitment to precise, demanding engineering work.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understand the principles and methods of mathematics applied in the field of engineering (T4) 2. Know the general and specific mathematical, scientific and social principles, rules, contexts and procedures for the operation of vehicles and mobile machinery (T9)

b) skills (k)

1. Demonstrates an understanding of mathematical concepts and expressions and the application of basic mathematical principles and processes to the interpretation of data and facts (K11)

c) attitude (a)

1. Choose from several options (A4)

d) autonomy and responsibility (o)

-

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 13%	1. t1,k1,a1
2. midterm test	2. ZH2	2. 13%	2. t1,k1,a1
3. midterm test	3. ZH3	3. 14%	3. t1,k1,a1

25. Exams			
Name	**Code**	**Share in final grade**	**Evaluated learning outcomes**
1. Exam papers	1. V	1. 60%	1. t1,k1,a1

26. Criteria to obtain a signature / midterm grade	27. Grading rules
At least 30% completion of each midterm tests	Excellent 86-100%, 71-85%, satisfactory 55-69%, pass 40-54%, fail 0-39%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
The midterms can only be retaken once	

30. Consultation
at a time and in a form agreed with the teacher
31. Learning materials
Lecture notes on website
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Mathematics A1e**				
2. Subject name in Hungarian	Matematika A1e			**3. Programme**	jkl
4. Subject code	**BMETEMIBSUMAT1-00**			**5. Term | role**	**1 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**4 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	34 hours	**Homework**	0 hours
Reading written materials	6 hours	**Midterm preparation**	24 hours	**Exam preparation**	32 hours

13. Organisational unit in charge	Department of Stochastics (TTK)		
14. Subject coordinator and its position	Dr. Sándor Csaba associate professor	**15. Email address**	sandor.csaba@ttk.bme.hu
16. …organisational unit	Department of Stochastics (TTK)		
17. Instructor(s)	Dr. Sándor Csaba, Dr. Mikovszki Tamás		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Students will learn the basics of mathematics and the fundamental mathematical concepts needed for technical thinking. In addition to this, students will develop their problem-solving skills and develop a commitment to precise, demanding engineering work through practical tasks.

20. Programme of lectures

Students will learn the basics of mathematics: the use of complex numbers, differential calculus of univariate real functions, integral calculus, the analytic geometry of three-dimensional Euclidean space.

21. Programme of practices

Students will learn the basic mathematical concepts necessary for technical thinking: the use of complex numbers, differential calculus of univariate real functions, integral calculus, analytic geometry of three-dimensional Euclidean space. In addition to this, students will develop their problem-solving skills and, through practice-oriented tasks, will develop a commitment to precise, demanding engineering work.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understand the principles and methods of mathematics applied in the field of engineering (T4) 2. Know the general and specific mathematical, scientific and social principles, rules, contexts and procedures for the operation of vehicles and mobile machinery (T9)

b) skills (k)

1. Demonstrates an understanding of mathematical concepts and expressions and the application of basic mathematical principles and processes to the interpretation of data and facts (K11)

c) attitude (a)

1. Choose from several options (A4)

d) autonomy and responsibility (o)

-

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 13%	1. t1,k1,a1
2. midterm test	2. ZH2	2. 13%	2. t1,k1,a1
3. midterm test	3. ZH3	3. 14%	3. t1,k1,a1

25. Exams			
Name	**Code**	**Share in final grade**	**Evaluated learning outcomes**
1. Exam papers	1. V	1. 60%	1. t1,k1,a1

26. Criteria to obtain a signature / midterm grade	27. Grading rules
At least 30% completion of each midterm tests	Excellent 86-100%, 71-85%, satisfactory 55-69%, pass 40-54%, fail 0-39%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
The midterms can only be retaken once	

30. Consultation
at a time and in a form agreed with the teacher
31. Learning materials
Lecture notes on website
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Mathematics A2a**				
2. Subject name in Hungarian	Matematika A2a - Vektorfüggvények			**3. Programme**	jkl
4. Subject code	**BMETE90AX02**			**5. Term | role**	**2 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**4 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	34 hours	**Homework**	0 hours
Reading written materials	6 hours	**Midterm preparation**	24 hours	**Exam preparation**	32 hours

13. Organisational unit in charge	Department of Stochastics (TTK)		
14. Subject coordinator and its position	Dr. Rónyai Lajos professor	**15. Email address**	lajos@math.bme.hu
16. …organisational unit	Department of Algebra and Geometry (TTK)		
17. Instructor(s)	Dr. Sándor Csaba, Dr. Mikovszki Tamás		
18. Indicative prerequisites	BMETE90AX00 Mathematics A1a - Analízis or BMETEMIBSUMAT1-00 Mathematics A1e, strong, - - -, - - -		

19. Purpose

Students will learn the basics of mathematics and the fundamental mathematical concepts needed for technical thinking. In addition to this, students will develop their problem-solving skills and develop a commitment to precise, demanding engineering work through practical tasks.

20. Programme of lectures

Students will learn the basics of mathematics: the main concepts and methods of linear algebra; the fundamental properties of multivariable functions; and the important series in engineering applications.

21. Programme of practices

Students will learn the basic mathematical concepts necessary for engineering thinking: the main concepts and methods of linear algebra; the basic properties of multivariable functions; and the important series for engineering applications. In addition to this, students will develop their problem-solving skills and, through practice-oriented tasks, will develop a commitment to precise, demanding engineering work.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understand the principles and methods of mathematics applied in the field of engineering (T4) 2. Know the general and specific mathematical, scientific and social principles, rules, contexts and procedures for the operation of vehicles and mobile machinery (T9)

b) skills (k)

1. Demonstrates an understanding of mathematical concepts and expressions and the application of basic mathematical principles and processes to the interpretation of data and facts (K11)

c) attitude (a)

-

d) autonomy and responsibility (o)

-

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 20%	1. t1,k1
2. midterm test	2. ZH2	2. 20%	2. t1,k1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Exam papers	1. V	1. 60%	1. t1,k1
26. Criteria to obtain a signature / midterm grade			**27. Grading rules**
At least 30% completion of each midterm tests			Excellent 86-100%, 71-85%, satisfactory 55-69%, pass 40-54%, fail 0-39%
28. Attendance and participation requirements			
according to the rules of CoS			
29. Retake and delayed completion			
The midterms can only be retaken once			
30. Consultation			
at a time and in a form agreed with the teacher			
31. Learning materials			
Lecture notes on website			
32. Start of validity for the subject decription			
September 1st, 2025			

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

Subject description

1. Subject name	**Mathematics A2e**				
2. Subject name in Hungarian	Matematika A2e			**3. Programme**	jkl
4. Subject code				**5. Term | role**	**2 | k**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**4 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	34 hours	**Homework**	0 hours
Reading written materials	6 hours	**Midterm preparation**	24 hours	**Exam preparation**	32 hours

13. Organisational unit in charge	Department of Stochastics (TTK)		
14. Subject coordinator and its position	Dr. Sándor Csaba associate professor	**15. Email address**	sandor.csaba@ttk.bme.hu
16. …organisational unit	Department of Stochastics (TTK)		
17. Instructor(s)	Dr. Sándor Csaba, Dr. Mikovszki Tamás		
18. Indicative prerequisites	BMETE90AX00 Mathematics A1a - Analízis or BMETEMIBSUMAT1-00 Mathematics A1e, strong, - - -, - - -		

19. Purpose

Students will learn the basics of mathematics and the fundamental mathematical concepts needed for technical thinking. In addition to this, students will develop their problem-solving skills and develop a commitment to precise, demanding engineering work through practical tasks.

20. Programme of lectures

Students will learn the basics of mathematics: the main concepts and methods of linear algebra; the fundamental properties of multivariable functions; and the important series in engineering applications.

21. Programme of practices

Students will learn the basic mathematical concepts necessary for engineering thinking: the main concepts and methods of linear algebra; the basic properties of multivariable functions; and the important series for engineering applications. In addition to this, students will develop their problem-solving skills and, through practice-oriented tasks, will develop a commitment to precise, demanding engineering work.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understand the principles and methods of mathematics applied in the field of engineering (T4) 2. Know the general and specific mathematical, scientific and social principles, rules, contexts and procedures for the operation of vehicles and mobile machinery (T9)

b) skills (k)

1. Demonstrates an understanding of mathematical concepts and expressions and the application of basic mathematical principles and processes to the interpretation of data and facts (K11)

c) attitude (a)

-

d) autonomy and responsibility (o)

-

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 20% 2. 20%	1. t1,k1 2. t1,k1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Exam papers	1. V	1. 60%	1. t1,k1
26. Criteria to obtain a signature / midterm grade			**27. Grading rules**
At least 30% completion of each midterm tests			Excellent 86-100%, 71-85%, satisfactory 55-69%, pass 40-54%, fail 0-39%
28. Attendance and participation requirements			
according to the rules of CoS			
29. Retake and delayed completion			
The midterms can only be retaken once			
30. Consultation			
at a time and in a form agreed with the teacher			
31. Learning materials			
Lecture notes on website			
32. Start of validity for the subject decription			
September 1st, 2025			

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

Subject description

1. Subject name	**Mathematics A3j**				
2. Subject name in Hungarian	Matematika A3j			**3. Programme**	j
4. Subject code				**5. Term | role**	**3 | k**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	30 hours	**Homework**	0 hours
Reading written materials	10 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Algebra and Geometry (TTK)		
14. Subject coordinator and its position	Dr. Millkovszki Tamás senior lecturer	**15. Email address**	milkovszki.tamas@ttk.bme.hu
16. …organisational unit	Department of Algebra and Geometry (TTK)		
17. Instructor(s)	Dr. Mikovszki Tamás		
18. Indicative prerequisites	BMETE90AX02 Mathematics A2a or BMETEMIBSUMAT2-00 Mathematics A2e, strong, - - -, - - -		

19. Purpose

Students will learn the basics of mathematics and the fundamental mathematical concepts needed for technical thinking. In addition to this, students will develop their problem-solving skills and develop a commitment to precise, demanding engineering work through practical tasks.

20. Programme of lectures

21. Programme of practices

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Know the general and specific mathematical, scientific and social principles, rules, contexts and procedures for the operation of vehicles and mobile machinery (T9)

b) skills (k)

-

c) attitude (a)

-

d) autonomy and responsibility (o)

-

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,k1 2. t1,k1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

27. Grading rules

At least 30% completion of each midterm tests	Excellent 86-100%, 71-85%, satisfactory 55-69%, pass 40-54%, fail 0-39%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
The midterms can only be retaken once	
30. Consultation	
at a time and in a form agreed with the teacher	
31. Learning materials	
Lecture notes on website	
32. Start of validity for the subject decription	
September 1st, 2025	

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

Subject description

1. Subject name	**Mechanics 1.**				
2. Subject name in Hungarian	Mechanika 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ2001-00**			**5. Term | role**	**2 | k**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	20 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	24 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Béda Péter professor	**15. Email address**	beda.peter@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Béda Péter, Dr. Forberger Árpád, Horváth Ádám, Görögh Tamás		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to impart kinematic and kinetic knowledge used in the current field.

20. Programme of lectures

Kinematics of a Material Point: Basic concepts, equation of motion, trajectory, degrees of freedom, velocity, acceleration, hodograph.

Kinematics of a Rigid Body:The concept of velocity and acceleration states, elementary and finite motions of a rigid body.

Planar Motion of a Rigid Body: Velocity pole, acceleration pole. Rolling motion of a rigid body. Determining motion characteristics in coordinate systems moving relative to each other.

Dynamics of a Material Point: Newton's axioms; the concept of an inertial frame. Deriving the law of motion from the equation of motion. Momentum and angular momentum of a material point. Theorems of momentum and angular momentum. Fundamental theorem of dynamics (for a material point). Kinetic energy of a material point. Power theorem, work-energy theorem. Conservative force field, potential. Constrained motion of a material point, constraint forces. Apparent forces in coordinate systems moving relative to an inertial frame.

Dynamics of a System of Material Points: The concept of a system of points, center of mass, momentum, angular momentum, kinetic energy.

Dynamics of a Rigid Body: Momentum, angular momentum, kinetic energy. Moment of inertia. Kinematic vector system of a rigid body and the fundamental law of dynamics. Power theorem and work-energy theorem. Dynamics of a rigid body in planar motion. Dynamics of a rigid body in spatial motion.

21. Programme of practices

Solving practical problems related to the theory presented in the lecture.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the mechanical principles, rules, relationships and procedures necessary for the field of vehicles and mobile machines. (T9,T10)

b) skills (k)

1. the student is able to apply the mechanical principles, rules, relationships and procedures necessary for the field of vehicles and mobile machines in engineering projects. (K19,K21)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of his/her team. (A2,A4,A7,A8,A15)

2. is receptive and proactive in the performance of the tasks assigned to him/her, self-critical of the tasks assigned to him/her (A5,A11,A12,A13,A14)

d) autonomy and responsibility (o)

1. Comply with standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 1. ZH2	1. 25% 1. 25%	1. t1,k1 2. t1,k1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1,k1,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

successful completion of the midterm tests (min. 50%)

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

The midterm tests can be replaced with the combined replacement test written in the delayed completion week.

27. Grading rules

0-49% fail
50-59% pass
60-69% satisfactory
70-84% good
85%- excellent

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Mechanics 2.**				
2. Subject name in Hungarian	Mechanika 2.			**3. Programme**	j
4. Subject code	**BMEKORHBSJ3001-00**			**5. Term | role**	**3 | k**
6. Credits	**5**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	40 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Veress Árpád associate professor	**15. Email address**	veress.arpad@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Faltin Zsolt István		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

Structural mechanics is a branch of physics, that deals with the study of the laws necessary to determine the dimensions of machines and their structural elements under given loads. During this course, the student will become familiar with the procedures necessary for the dimensioning of machines and the relationships necessary for their structural development.

20. Programme of lectures

Principal mathematical calculations (Vector and Matrix calculations and Determ), computation of deformations, deflections and internal forces or stresses of structures, the definition of a solid (but not rigid) body, equivalnt stresses, methods of structural analysis, the definition of the main structural loads, the examination of the properties of different structures, stresses and displacements. This course incudes also the discussion of the energy principles in structural mechanics, stiffness methods and also the topics of beam theory, torsion, trusses, Stiffening, the theories of Betti, Maxwell and Castigliano and also the basic Hooke law and the theorem of Mohr and the Huber-Mises-Hencky criterion for tensile stresses.

21. Programme of practices

Solving and practicing exercises required by the lectures.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic physical rules of structural mechanics (T9,T10)

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies of vehicle structural mechanics and structural planning in a meaningful way
2. is able to communicate the ideas and plans about mechanics of vehicle structures clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 91-100%
Good 76-90%
Satisfactory 61-76%
Pass 50-60%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

with the teacher at a previously agreed time and form

31. Learning materials

Presentation slides and additional practicing materials

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Mechanics 3.**				
2. Subject name in Hungarian	Mechanika 3.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ4002-00**			**5. Term | role**	**4 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	0 hours	**Midterm preparation**	18 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Béda Péter professor	**15. Email address**	beda.peter@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Béda Péter, Dr. Forberger Árpád, Horváth Ádám, Görögh Tamás		
18. Indicative prerequisites	BMEKOVJBSJ2001-00 Mechanika 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to impart the basic knowledge of analytical mechanics used in the current field.

20. Programme of lectures

Mechanical systems, constraints, degrees of freedom, application of the power theorem (or energy balance). General coordinates, Lagrange equation of the second kind. Application of Lagrange equation of the second kind on examples. General forces in special cases (potential, dissipative, gyroscopic, excitatory) Equilibrium position, conditions for the existence of the equilibrium position, stability. Small displacements around a stable equilibrium position.

Oscillating systems with one degree of freedom. Oscillating systems with several degrees of freedom

21. Programme of practices

Solving practical problems related to the theory presented in the lecture.

22. Programme of laboratories

The use of MATLAB in problem solving

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the principles, rules, relationships and procedures of analytical mechanics necessary for the field of vehicles and mobile machines. (T9,T10)

b) skills (k)

1. the student is able to apply the principles, rules, relationships and procedures of analytical mechanics, necessary for the field of vehicles and mobile machines in engineering projects. (K19,K21)

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of his/her team. (A2,A4,A7,A8,A15)

2. is receptive and proactive in the performance of the tasks assigned to him/her, self-critical of the tasks assigned to him/her (A5,A11,A12,A13,A14)

d) autonomy and responsibility (o)

1. Comply with standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. midterm test 2. midterm test	1. ZH1 1. ZH2	1. 25% 1. 25%	1. t1,k1 2. t1,k1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1,k1,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

successful completion of the midterm tests (min. 50%)

27. Grading rules

0-49% fail
50-59% pass
60-69% satisfactory
70-84% good
85%- excellent

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

The midterm tests can be replaced with the combined replacement test written in the delayed completion week.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Mechatronics of mobile machinery**				
2. Subject name in Hungarian	Mobil gépek mechatronikája			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ6C03-00**			**5. Term | role**	**6 | sp**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	14 hours	**Homework**	35 hours
Reading written materials	14 hours	**Midterm preparation**	31 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Aradi Szilárd associate professor	**15. Email address**	aradi.szilard@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Aradi Szilárd, Doba Dániel, Csuzdi Domonkos		
18. Indicative prerequisites	BMEKOKJBSJ5C01-00 Járműfedélzeti rendszerek 2. recommended core, - - -, - - -		

19. Purpose

The objective of the course is to introduce students to the basic concepts and practices of robotics applications, to develop their Python programming skills, and to master the principles of object-oriented programming.

During the theoretical and practical training, students will become familiar with the system architectures used in robotics and highly automated vehicle development (Robot Operating System 2- ROS2), with particular attention to the different stages of development and practical challenges, as well as the programming techniques used during development. The goal is that by the end of the course, students will be able to develop and test simple robotics applications.

20. Programme of lectures

The aim of the lectures is to familiarize students with the process and memory management of modern operating systems, the architecture of the Robot Operating System 2 framework, its basic principles of operation, the basics of IP-based network communication, and the environmental sensing and basic control algorithms of robotic applications.

21. Programme of practices

The practical sessions aim to familiarise students with the Linux operating system, practical applications of terminal commands, the use of the ROS2 framework, version control systems (git), and to develop their Python programming skills in practice.

22. Programme of laboratories

During the lab, students will develop various robotics applications, using and integrating their acquired knowledge of Linux, ROS2, and Python. They will learn how to handle sensors and actuators and the basics of sending and receiving messages. This will enable students to develop and test simple robotics applications.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the usage of the Python language in robotics applications.
2. Knows the principles of object-oriented programming, including classes, inheritance, and polymorphism.
3. Knows the basics of the Linux operating system, including file management, command line usage, and version control.
4. Knows the basics of the ROS2 framework, including the operation of nodes, topics, and services.
5. Knows the basics of developing robotics applications, the basics of environmental perception and controlling robots.

b) skills (k)

1. Able to design and implement object-oriented programs in Python in a PC environment.
2. Able to design and implement robotic functions in Linux and ROS2 environments.
3. Able to use version control systems (git) and manage code.

c) attitude (a)

1. Open to modern robotic solutions.

2. Interested in complex system architectures and programming environments.

d) autonomy and responsibility (o)

1. Able to independently review a system architecture and master a programming environment.
2. Able to work in a team and participate in the design and implementation of complex robotics systems.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework	1. ZH 2. HF	1. 50% 2. 50%	1. t1-t5,o1 2. k1-k3,a1,a2,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Both the midterm test and a homework must result in at least a grade of 2.

27. Grading rules

0%-40%: fail; 41%-55%: pass; 56%-70%: satisfactory; 71-85%: good; 86%-100%: excellent

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is allowed for the midterm test and homework requirements.

30. Consultation

After prior arrangement, meetings are possible at any time during the semester, both in person and online.

31. Learning materials

Lecture slides, electronic course material.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Modern locomotives**				
2. Subject name in Hungarian	Korszerű vontatójármű-rendszerek			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ6F01-00**			**5. Term | role**	**6 | sp**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	28 hours	**Homework**	0 hours
Reading written materials	30 hours	**Midterm preparation**	36 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Zábori Zoltán tudományos főmunkatárs	**15. Email address**	zabori.zoltan@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Kiss Csaba, M. Szűcs Máté		
18. Indicative prerequisites	BMEKOVJBSJ5F01-00 Dízel vontatójárművek recommended core, - - -, - - -		

19. Purpose

To introduce railway specialization students to the novelties and characteristics of today's modern traction vehicles, as well as the basics and characteristics of their structure, operating principle and structures.

20. Programme of lectures

By mastering the knowledge material, the student knows and understands the role and task of the vehicle in rail transport, the causes and consequences of the complexity of the rail transport system, the impact of the system elements and processes of rail transport on the design and properties of the vehicle, the requirements that can be formulated for a modern rail vehicle and their impact on the design and characteristics of the vehicle, the task and main characteristics of the systems and (sub)systems used on the vehicles, the design and characteristics of the energy conversion systems used on the vehicles, the different ways of supplying energy to the vehicles, their distribution, characteristics, advantages and disadvantages, the purpose, elements and their role of the life cycle management of modern rail vehicles, and by mastering the subject, the vehicle-centered synthesis of the transport system.

21. Programme of practices

Vehicle technical calculations related to modern towing vehicles, examination and comparison of energy conversion systems, efficiency and environmental calculations.

22. Programme of laboratories

Vehicle technical calculations related to modern towing vehicles, examination and comparison of energy conversion systems, efficiency and environmental calculations.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the characteristics and elements of railway traction vehicles.
2. Is aware of the novelties and characteristics of modern traction vehicles, and is also familiar with their structure, operating principle and the basics and characteristics of their structures.

b) skills (k)

1. Is able to navigate the system of physical concepts and units of measurement used in vehicle technology.
2. Is able to recognize and navigate the specifics of modern railway traction vehicles.
3. Is able to determine basic railway traction vehicle characteristics, analyze and compare different traction systems.

c) attitude (a)

1. Is open and receptive to new knowledge.
2. Meets the expectations of engineering work – demanding, clear and precise.

d) autonomy and responsibility (o)

1. Takes the first step without waiting for what others say or do.

2. Expresses own opinion on issues related to railway vehicles.
3. Solves the own task and controls it.
4. Takes responsibility for the correct documentation of the methods and procedures used.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. I. Midterm test 2. II. Midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,t2,k1-k3,a1-a3,o1-o4 2. t1,t2,k1-k3,a1-a3,o1-o4

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm tests

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

According to the rules set out in the AER.

29. Retake and delayed completion

The midterm tests can be made up separately in the form of one make-up and one repeated make-up.

30. Consultation

At a time and in a format agreed upon with the instructor.

31. Learning materials

1. Dr. Sostarics György -Dr. Balogh Vilmos: Railway vehicles (in Hungarian). Course book, ISBN: 963-18-3113-2 2. Prof. Dr. Zobory István: Railway technology handbook (in Hungarian). ISBN: 9789632041278 3. Varga Jenő (ed.): Railway diesel traction units (in Hungarian). Műszaki Könyvkiadó, 1974 4. Course materials.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Noise, vibration and harshness**				
2. Subject name in Hungarian	Akusztika, rezgés és komfort			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6A01-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	22 hours	**Homework**	0 hours
Reading written materials	26 hours	**Midterm preparation**	30 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Dömötör Ferenc associate professor	**15. Email address**	domotorf@edu.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Dömötör Ferenc		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to introduce to the basics of NVH (noise, vibration, harshness), acoustics, vibration and vehicle comfort.

20. Programme of lectures

Introduction to the basics of NVH (noise, vibration, harshness), acoustics, vibration and vehicle comfort. Determining the noise characteristics of motor vehicles using a technical method. System of air and body sound excited noise sources of motor vehicles. Structural noise sources of motor vehicles, whole-vehicle acoustics. Basic concepts related to the vibrations of machines and vehicles. Basic concepts of vibration measurement and vibration analysis. Gearbox and bearing diagnostics of machines and vehicles with vibration measurement. Basic concepts related to torsional vibrations.

21. Programme of practices

Instruments for noise and vibration measurement. Solving the numerical problems related to the material of the presentation.

22. Programme of laboratories

Measurement of the noise level of internal combustion engine and electric vehicles in different operating conditions. Vibration measurement on the department's test bench (gearbox and bearing test). Examination of torsional vibrations with modern tools.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic concepts of NVH (noise, vibration, harshness), acoustics, vibration and vehicle comfort,
2. knows the structural noise sources of motor vehicles, and of the basic concepts of whole-vehicle acoustics.
3. get know the basic concepts related to the vibrations of machines and vehicles (measurement, analysis).
4. get know the basic concepts related to torsional vibrations.

b) skills (k)

1. using the knowledge about acoustics, vibration and vehicle comfort, and the related professional knowledge, is able to get involved in the solution of diagnostic tasks arising in the technical field.

c) attitude (a)

1. is aspired to always give the maximum of your abilities, to work accurately and error-free.
2. strives to comply with accident prevention rules and to cooperate with colleagues.

d) autonomy and responsibility (o)

1. feels responsible for setting an example to the peers with the quality of the work and the observance of ethical standards, responsibly applying the knowledge acquired during the subject.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,k1,a1,o1 2. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing the midterm tests.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm tests can be retaken twice.

30. Consultation

Every lecture

31. Learning materials

Beranek, L. L.: Noise mitigation (in Hungarian). Műszaki Könyvkiadó, Budapest, 1967.
Domokos, E. – Horváth B. (ed.): Environmental engineering knowledge base, Vol. 13. Noise and vibration protection (in Hungarian). Pannon Egyetem, Környezetmérnöki Intézet, Veszprém, 2011.
Bihari Z. (ed.): Acustic and vibration qualification (in Hungarian), Miskolci Egyetem, Gép- és Terméktervezési Tanszék, Miskolc, 2011.
Heckl, M. - Müller, H.A.: Taschenbuch der techn. Akustik, Springer Verlag Berlin, 1975.
Smetana, C: Noise and vibration measurement (in Hungarian). Műszaki Könyvkiadó 1975. Bp. 222.p.
Kováts A.: Noise and vibration diagnostics (in Hungarian), Miskolci Egyetem.2008.
Dömötör F. (szerk.): Vibration diagnostics I. (in Hungarian), Dunaújváros 2007.
Dömötör F. (szerk:): Vibration diagnostics II. (in Hungarian), Dunaújváros 2010.
Tímár P. L. (ed.): Noise and vibration of electric machines (in Hungarian). MK, Bp.
P. Nagy József: Theory and practice of acustic insulation (in Hungarian), Akadémiai Kiadó,
Kováts A.: Machine structures (Engineering acustics) (in Hungarian), Tankönyvkiadó, Bp.,1993.
Kováts A.: Noise and vibration protection (in Hungarian). - Veszprémi Egyetemi Kiadó, 2005.
Tarnóczy T.: Room acustics I.-II. (in Hungarian). Akadémiai Kiadó, Budapest, 1986.
Brüel & Kjaer product catalogs

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**On-board vehicle communication**				
2. Subject name in Hungarian	Járműfedélzeti kommunikáció			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ4C02-00**			**5. Term | role**	**4 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	14 hours	**Homework**	15 hours
Reading written materials	20 hours	**Midterm preparation**	29 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Szabó Géza associate professor	**15. Email address**	szabo.geza@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Szabó Géza		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

It gives an overview about the communication techniques used in vehicles.

20. Programme of lectures

The subject introduces the basic principles and basic technics of communication; and based on it, as a second step, it introduces state of the art communication systems, their features, advantages and application limits. Through complex examples it shows the system integration as well. It provides application knowledge about communication.

21. Programme of practices

-

22. Programme of laboratories

Application of the principles on devices presented on lectures.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basics of the communication, the signal processing basics, the communication networks, the OSI model, the widely used vehicle communication technologies.

b) skills (k)

1. is able to understand the communication specifications, to identify basic communication problems and tasks and knows the basic solutions.

c) attitude (a)

1. participates in solving basic communication problems in vehicles.

d) autonomy and responsibility (o)

1. is aware of and treats the responsibility associated with the task solution during communication system problem solving.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework 3. two laboratory measurements and reports	1. ZH 2. HF 3. JK	1. 85% 2. 15% 3. 0%	1. t1,k1,a1,o1 2. t1,k1,a1,o1 3. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes

-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Successful midterm test, accepted homework and laboratory reports.	0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent
28. Attendance and participation requirements	
According to TVSZ	
29. Retake and delayed completion	
The test has individual re-test and a second (paid) re-tests (in the delayed completion week). Homework can be corrected or submitted during the delayed completion week (paid). The laboratory practices can be re-taken during the delayed completion week; reports about labs can be submitted or corrected during this period (paid).	

30. Consultation
At a time and in a form agreed with the teacher.
31. Learning materials
1. Géher K (szerk.): Telecommunication engineering (in Hungarian).; 2. Lecture notes
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Operation and diagnostics of railway vehicles**				
2. Subject name in Hungarian	Vasúti járművek üzeme és diagnosztikája			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ6F03-00**			**5. Term | role**	**6 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	16 hours
Reading written materials	24 hours	**Midterm preparation**	12 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Németh István, Ferencz Péter, M.Szűcs Máté		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

To familiarize future railway vehicle engineers with the systems, processes and activities related to the homologation, operation and diagnostics of railway vehicles.

20. Programme of lectures

The development of rail transportation and of its subsystems. Structure of the railway track, system of markings and signals. Markings of railway vehicles. Dangers and working conditions on the railway; special labour safety rules, fire and environmental protection in the railway operation. Accident prevention, technical rescue. EU and domestic legislation and actors of the rail transport system. System and processes of homologation of railway vehicles. Activities of Notified, Designated and Safety Assessment Bodies. Type tests of railway vehicles: bogie and vehicle body strength, brake and running dynamics tests. Establishment and mechanical equipment of depos for railway vehicle service. The role of the entities in charge of maintenance. Operational and performance indicators related to the operation of vehicles. Vehicle reliability. Application of inventory models in the operation of railway vehicles. Structure of locomotive and crew turns. Practical rules and railway instructions for train composition and train transportation. Diagnostics of the track-vehicle system. Vibration diagnostics of railway vehicles, evaluation of vibration comfort.

21. Programme of practices

During the internships, students solve computational tasks in the field of traction plant processes. Calculation of the underlay required for wheel load compensation. Solve a stockpiling job. Reliability calculations. Locomotive and crew turn calculation. Determination of the power spectral density function and comfort rating number.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the structure of the railway system, its actors, the regulations and processes related to the licensing and operation of vehicles
2. Knows the type test of railway vehicles
3. Knows the safety and occupational safety rules of railway operation, the methods of technical rescu.
4. Recognizes markings used in railway operation
5. Knows the technical equipment of railway vehicle depots
6. Knows the performance and reliability characteristics related to the operation of railway vehicles
7. Knows inventory task related to the operation of railway vehicles
8. Knows the basic principle of track-vehicle system diagnosics

b) skills (k)

1. Is able to compile and systematize relevant specifications and necessary type test measurements from the point of view of the homologation of a given railway vehicle
2. Is able to explain the tasks of the different railway conformity assessment bodies and their interconnections.
3. Is able to determine and analyse the reliability characteristics of railway vehicles
4. Is able to use simple inventory procedures
5. Is able to create computer implementations for the evaluation of vehicle diagnostic signals based on simple algorithms

c) attitude (a)

1. Is independently interested and open to new technical solutions and procedures in the field)
2. Strives to increase the quality and reliability of railway rolling stock operatio

d) autonomy and responsibility (o)

1. Keeps and makes others comply with work protection and railway safety regulations.
2. Takes on responsibility for compliance of the procedures applied.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test	1. ZH	1. 50%	1. t1-t3,t7,k1,k2,o1,o2
2. Railway vehicle marking system assignment	2. F1	2. 10%	2. t4,a1,a2,o1
3. Wheel load assignment	3. F2	3. 10%	3. t5,a1,a2,o2
4. Inventory assignment	4. F3	4. 10%	4. t6,k3,a1,a2,o2
5. Reliability assignment	5. F4	5. 10%	5. t7,k5,a1,a2,o2
6. Diagnostics assignment	6. F5	6. 10%	6. t8,k6,a1,a2,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Successful completion of the midterm test (min. 50%) and submission of the assignments on the lessons.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

The midterm test can be replaced separately, and in addition, one of the mid-term requirements can be made up in the framework of repeated replacement.

30. Consultation

At a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Operation of ships**				
2. Subject name in Hungarian	Hajóüzemtan			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4G03-00**			**5. Term | role**	**4 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	14 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	42 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba, Dr. Simongáti Győző		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the course is to provide students with important information on the operation of ships.

20. Programme of lectures

Types of ships. Description of navigation modes. Specialties in pushing, towing and self-propelled shipping. Knowledge of inland waterways, signs, nautical rules. Basic navigation skills. International regulatory system for inland navigation. Inland navigation authorities.

21. Programme of practices

-

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the ship operation technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the operation environment of ships in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 100%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Pleasure craft**				
2. Subject name in Hungarian	Kishajók			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6G03-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	23 hours	**Midterm preparation**	25 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Simongáti Győző		
18. Indicative prerequisites	BMEKORHBSJ7G01-00 Hajók elmélete recommended core, - - -, - - -		

19. Purpose

The aim of the course is to introduce students to aspects of small craft not covered in other courses that deal mainly with commercial vessels and to lay the groundwork for the subsequent design course.

20. Programme of lectures

Introduction, historical background. Grouping of pleasure craft, definitions, regulations for small boats. Balance of forces. Special aspects of small craft stability. Typical small ship propulsion. Speed estimation of small boats. Rudder system installations. On-board equipment.

21. Programme of practices

Solving and practicing exercises required by the lectures.

22. Programme of laboratories

Towing tank experiment on sailing boat - virtual laboratory by using availaable videos of towink tanks.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the pleasure craft operation technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the operation environment of pleasure craft in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. V	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Professional networking**				
2. Subject name in Hungarian	Szakmai kapcsolatépítés			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ7A01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	20 hours	**Homework**	22 hours
Reading written materials	20 hours	**Midterm preparation**	0 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Lelkes Márk senior lecturer	**15. Email address**	lelkes.mark@edu.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Lelkes Márk		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the course is to develop the soft skills necessary for engineering work.

20. Programme of lectures

In the framework of the classes, the literature (video material, books, etc.) is processed, the individual tasks are consulted and the common task parts are discussed:

- Basics of building relationships, communication, body language, appearance, etc.,
- Conscious professional "self-branding" construction,
- Learning the basics of self-knowledge,
- Getting to know the basic logic of professional conferences,
- Types of conferences, basis for choosing between sections,
- Effective and prepared participation in conferences, both professionally and from a relational point of view, with reflection.

21. Programme of practices

Based on the classes, with the help of the instructor's guidance, the students prepare professionally for a conference: by prioritizing and filtering articles and processing selected articles. This is followed by participation in a conference, followed by a professional and individual evaluation in conjunction with an instructor's consultation.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. gets familiar with the basic knowledge of self-knowledge, the basic logic of professional conferences, the basics of professional self-branding

b) skills (k)

1. is able to participate in a conference in a value-creating way, to increase the network of contacts

c) attitude (a)

1. is open to new opportunities and solutions in the field

d) autonomy and responsibility (o)

1. trains for a professional independent life through responsible self-development

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. reflection	1. R	1. 100%	1. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Attendance at lectures and practices, participating in a pre-arranged conference within the scope of the subject, making a reflection on this in the manner learned.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

The basic requirement for students is attendance at lectures and practices, 30% absence is acceptable.

29. Retake and delayed completion

The reflection can be submitted in the delayed completion week for a fee.

30. Consultation

Every lecture

31. Learning materials

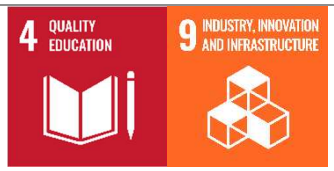
PPT, conference, Linkedin,
https://nyitok.hu/leckek/18,47,358/vallalati_kultura_munkahelyi_egyuttmukodes/szemelyisegunk_a_disc_tipusok#q=,s=6

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Programming**				
2. Subject name in Hungarian	Programozás			**3. Programme**	jkl
4. Subject code	**BMEKOKJBSM1001-00**			**5. Term | role**	**1 | k**
6. Credits	**7**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**4 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**210 hours**
Contact hours	84 hours	**Preparation for lessons**	36 hours	**Homework**	40 hours
Reading written materials	10 hours	**Midterm preparation**	40 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Bécsi Tamás associate professor	**15. Email address**	becsi.tamas@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Bécsi Tamás, Dr. Fehér Árpád, Dr. Szabó Ádám, Dr. Törő Olivér		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

To develop the algorithmic thinking of engineering students through the teaching of a selected, widespread programming language.

20. Programme of lectures

During the lecture, students will learn about the need for programming, control structures (branches, loops), data management, and the use of functions and data structures. The lecture introduces the fundamentals of algorithm theory and the basics of the object-oriented approach. Students will learn debugging, file management, and the application of basic algorithms (searching, sorting) through practical examples. The course prepares students for further programming and computer science studies.

21. Programme of practices

-

22. Programme of laboratories

The lab sessions help to deepen the practical learning of the lecture. As part of this, students perform basic programming and algorithm design tasks independently, with the help of a qualified instructor.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic concepts of computer science (K:T17;J:T21;L:T21)
2. knows the basic concepts of structured programming and the syntax of a language studied in the course (K:T17;J:T21;L:T21)
3. knows elementary algorithm design methods and their implementation options (K:T16;J:T17)
4. has knowledge of the basics of object-oriented programming (K:T16;J:T17)

b) skills (k)

1. Able to understand, model and measure the functioning of the physical world using digital tools, as well as to explore cause-and-effect relationships and apply them in rule-based systems. (J,K,L:K10)
2. Able to process structured data, effectively search, evaluate and manage digital content. (K:K28,K29,K30,K31;J:K36,K37,K38,K39;L:K31,K32,K33,K34)
3. Able to design, program, operate and test IT systems based on models. (K:K12,K32,K34,K35,K36;J:K12,K40,K42,K43,K44;L:K12,K35,K37,K38,K39)

c) attitude (a)

1. Recognizes and accepts that designing, programming, and applying digital systems involves responsibility, and strives to understand, take ownership of, and respect the consequences of professional decisions — both for themselves and others. (J,K,L:A2)
2. Strives to critically assess and select from various digital technology solutions, and to apply them in a way that achieves the desired goals with minimal use of time, effort, or resources. (J,K,L:A4,A10)

d) autonomy and responsibility (o)

1. Makes decisions independently and responsibly during the design and implementation of digital solutions, is capable of identifying and correcting own mistakes, and formulates proposals for optimal programming steps in a creative manner. (J,K,L:O2,O3)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test 3. programming homework	1. ZH1 2. ZH2 3. HF	1. 1/3 2. 1/3 3. 1/3	1. t1,t2,k1 2. t3,t4,k2,k3 3. a1,a2,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

A minimum 40% average of ZH1 and ZH2, and a minimum 40% result of HF.

27. Grading rules

Excellent: 85–100%
Good: 70–84%
Satisfactory: 55–69%
Pass: 40–54%
Fail: 0–39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Only one of the mid-semester requirements can be made up through repeated replacement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Propulsion and aircraft engines**				
2. Subject name in Hungarian	Propulzió és repülőgép hajtóművek			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4B03-00**			**5. Term | role**	**4 | sp**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	20 hours	**Homework**	0 hours
Reading written materials	30 hours	**Midterm preparation**	30 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Rohács Dániel associate professor	**15. Email address**	rohacs.daniel@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Rohács Dániel, Dr. Veress Árpád		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Understanding the types, operation and systems of aircraft engines

20. Programme of lectures

Propulsion (M14), gas turbine engines (M15), reciprocating engines (M16), propellers (M17/A) according to EASA Part 66.

21. Programme of practices

Present practical solutions for each topic

22. Programme of laboratories

Getting to know the equipment through laboratory exercises

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the aircraft engines and propulsion technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies in aircraft engines and propulsion in a meaningful way
2. is able to communicate the ideas and plans about aircraft propulsion technologies clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 0%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 100%	1. t1,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade	27. Grading rules
successful (min. 50%) completion of the midterm tests	Excellent 88-100% Good 75-87% Satisfactory 63-74% Pass 50-62% Fail 0-49%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
Second retake from the midterm test.	

30. Consultation
at a time and in a form agreed with the lecturers
31. Learning materials
Lecture slides, electronic course material Literature (in English)
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Propulsion of ships**				
2. Subject name in Hungarian	Hajók hajtása			**3. Programme**	j
4. Subject code	**BMEKORHBSJ5G02-00**			**5. Term | role**	**5 | sp**
6. Credits	**5**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	17 hours	**Homework**	32 hours
Reading written materials	20 hours	**Midterm preparation**	0 hours	**Exam preparation**	25 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Hargitai L. Csaba senior lecturer	**15. Email address**	hargitai.laszlo.csaba@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba		
18. Indicative prerequisites	BMEKORHBSJ7G01-00 Hajók ellenállása recommended core, - - -, - - -		

19. Purpose

The aim of the course is to familiarise students with the ship propulsion calculation.

20. Programme of lectures

1 Types of propellers and their common operating principle.
2 Efficiency, energy loss in the propulsion system
3 Open water model experiments with propellers.
4 Concepts of thrust factor, torque factor.
5 Propeller open water characteristic curves.
6 Hull and propeller interaction.
7 Operation and selection of the propeller for a given thrust requirement or given engine power and speed.
8 Cavitation calculation.
9 Elementary propeller geometry.

21. Programme of practices

Solving and practicing ship propulsion system calculations and propeller selection tasks.

22. Programme of laboratories

Learn how to determine propeller thrust, required thrust, thrust deduction fraction, wake fraction and propulsion efficiency.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student
a) knowledge (t)
1. knows the basic physical rules about propulsion of ships
b) skills (k)
1. is able to reproduce, adapt and interpret the propulsion technologies of ships in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others
c) attitude (a)
1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks
d) autonomy and responsibility (o)
1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others

2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework (making a resistance calculation and documentation)	1. F	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1

26. Criteria to obtain a signature / midterm grade

submission of assignments on time or on lessons

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the homework.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Quality improvement methods in the automotive industry**				
2. Subject name in Hungarian	Minőségfejlesztési módszerek a járműiparban			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ5D02-00**			**5. Term | role**	**5 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	22 hours	**Homework**	0 hours
Reading written materials	15 hours	**Midterm preparation**	25 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Hlinka József senior lecturer	**15. Email address**	hlinka.jozsef@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Hlinka József		

18. Indicative prerequisites	BMEKOGJBSJ3001-00 Gyártástechnológia recommended core, - - -, - - -

19. Purpose

The course introduces students to the fundamental concepts of quality and quality management, including the establishment, operation, review, and continuous improvement of quality management systems. Key topics include: the principles of quality management, the definition of quality, quality requirements, process modeling techniques, major process types, documentation systems for quality management activities, auditing, and relevant standards.

The corporate quality management module covers: strategic planning, management's quality-related responsibilities, quality creation methods (e.g., QFD), risk reduction techniques (fault tree analysis, FMEA), production process quality control (SPC, TPM), supplier selection, and product traceability. Measurement and inspection methodologies are also addressed, along with LEAN principles and their associated tools

20. Programme of lectures

Quality Creation Methods; Control Systems, Standards, and Case Studies; Measurement and Inspection Activities, Protocols; FMEA; Auditing; LEAN and Its Tools; 8D

21. Programme of practices

-

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Is familiar with fundamental quality development concepts and tools in the automotive industry.

b) skills (k)

1. By applying the knowledge of quality development and related professional expertise, is capable of contributing to solving tasks in automated manufacturing systems.

c) attitude (a)

1. Strives to identify interdisciplinary connections, independently interprets lecture content (including theories, statements, and diagrams).
2. Remains open to collaborative thinking with instructors and peers.
3. Commits to active participation in lectures.

d) autonomy and responsibility (o)

1. Accepts the established framework for completing the course, and within this framework, carries out tasks independently and responsibly, adhering to ethical standards.
2. Applies knowledge acquired during the course responsibly, while being mindful of its validity limits.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,k1,a1-a3,o1,o2 2. t1,k1,a1-a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing the midterm tests.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm tests can be retaken twice.

30. Consultation

Every lecture

31. Learning materials

Zoltán Koczor: Development of quality management systems, TÜV-Rheinland-Inter Cert 2008.
Gábor Veress: Basics of Quality Management, MK-Hungarian Quality Association 1999.
Attila Gutassy: Quality Management for Everyone, Raabe Klett, Budapest, 2017.
Attila Gutassy: Quality Management in Practice, Raabe Klett, Budapest, 2018.
Norbert Fehér: The LEAN SIX SIGMA Process Improvement Handbook, Cash Flow Navigátor Tanácsadó Kft., Zalaegerszeg, 2018.
János Kosztolányi, Gábor Schwahofer: Guide to the practical application of lean, Kaizen Pro Kft., Budapest, 2016.

32. Start of validity for the subject decription

September 1st, 2025

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	Minőségügy			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ5001-00**			**5. Term | role**	**5 | k**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	20 hours	**Midterm preparation**	32 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Török Árpád tudományos főmunkatárs	**15. Email address**	torok.arpad@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Török Árpád		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the lecture is to introduce students to the importance and applicability of quality management systems in different sectors of transport and the automotive industry. It also introduces students to the application of basic quality procedures.

20. Programme of lectures

Topics of "Quality management in vehicle technique": the significance and importance of quality management; the development of quality systems and their characteristics in major economic regions; standards-based quality management systems and their role; quality (business excellence) awards and their role; legal frameworks for quality, regulators of quality; certification, auditing; economic aspects of quality; implementing the philosophy of 'better quality at a lower cost'; quality concepts, conformity, conformity assurance, quality characteristics, quality levels, quality creation and key phases, quality sources, quality control, organizational framework; ISO 9000 family of standards, industry quality management standards, QS 9000 and ISO TS16949 standards, environmental management system, integrated quality management systems, process integrated quality management system, quality awards, TQM; self-monitoring, team culture, project culture, project management, continuous improvement, PDCA principle, problem solving and techniques.

21. Programme of practices

Students will learn about different applications of FMEA, 5S, VSM, QVSM methods.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic concepts and tools of quality in the automotive industry.

b) skills (k)

1. is able to apply basic quality methods.

c) attitude (a)

1. consistently strives to perform at their highest capability, maintaining precision and error-free workmanship, is committed to adhering to safety regulations and fostering collaborative relationships with colleagues.

d) autonomy and responsibility (o)

1. feels a strong sense of responsibility to set an example for their peers through the quality of the performed work and adherence to ethical standards, conscientiously applying the knowledge acquired during the course.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH1	1. 50%	1. t1,k1,a1,o1

2. midterm test	2. ZH2	2. 50%	2. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing the midterm tests

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm tests can be retaken twice.

30. Consultation

Every lecture

31. Learning materials

Course bulletins available in moodle.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Railway vehicle mechatronics**				
2. Subject name in Hungarian	Vasúti jármű mechatronika			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ7F01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	36 hours	**Midterm preparation**	16 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Kemény Zsolt senior lecturer	**15. Email address**	kemeny.zsolt@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Kemény Zsolt		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

To prepare future railway engineers for correct interpretation and handling of legacy vehicle mechatronics solutions, as well as for technically correct solution of new mechatronics problems with a skill- and toolset that includes modern solution approaches

20. Programme of lectures

Mechatronics as the integreted application of vehicle engineering, electircity, computer and control engineering. Sensors and actuators. Signal conditioning. Data display systems. Mechanical, hydraulic, pneumatic and electrical systems. System models and transfer properties: equations of motion, signal flow graph, response in time and frequency domains. Equivalence of mechanical systems and electric networks: Hähnle–Firestone analogy (mobility approach), Trent analogy ("through" and "across" quantities). Electronically controlled secondary suspension improving running characteristics. Control with electronics. Analog circuits: application of operational amplifiers. Digital circuits: logic gates, programmable logical devices, processors. Requirements of embedded systems, real-time systems. Structure and programming of microcontrollers.

21. Programme of practices

Demonstration and practice of the methods presented in the lectures through practical examples.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Has comprehensive knowledge of basic facts, trends, limitations of the technical field of study and the expected core professional competencies, which include and describe knowledge, ability, attitude, as well as autonomy and responsibility.

b) skills (k)

1. Acquires and applies knowledge of the railway vehicle mechatronics and its principles, e.g., by making reasonable predictions regarding causes and effects, elaborating tests of the predictions, and making measurements relying on appropriate measurement units, tools, and equipment.

2. Capability of basic analysis of the chosen railway disciplines that make up the knowledge system of the field, of synthetic expression of its relationships and of adequate evaluation activities.

3. Ability of identifying routine problems, exploring the theoretical and practical backgrounds necessary for their solution, and elaborating solutions through the practical application of standard approaches in the field of railway vehicle mechatronics.

4. Ability of modeling railway vehicle mechatronics systems and processes.

5. Applies data processing methods (digital competency).

6. Elaborates control systems.

c) attitude (a)

1. Acquires ability of independent critical thinking.
2. Considers multiple options.
3. Strives to achieve objectives with minimal time, effort, or cost.
4. Demonstrates a positive attitude towards new, challenging needs that can only be met through life-long learning.
5. Open to learning, internalizing, and authentically sharing professional, technological development and innovation in the field of vehicles and mobile machinery.

d) autonomy and responsibility (o)

1. Critically evaluates authenticity and trustworthiness of information before using it or sharing it with others.
2. Uncovers the shortcomings of technologies used, the risks of related processes, and takes actions to reduce or mitigate them.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test (1st) 2. Midterm test (2nd)	1. ZH-1 2. ZH-2	1. 50% 2. 50%	1. t1,k1-k6,a1-a5,o1,o2 1. t1,k1-k6,a1-a5,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Successful (min. 50%) completion of both midterm tests

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

According to the rules of CoS

29. Retake and delayed completion

Both midterm tests can be retaken once. Second retake is only for one midterm requirement.

30. Consultation

1. During the lecture preceding each midterm test
2. At a time and in a form agreed upon with the lecturer

31. Learning materials

1. Lecture presentations
2. Lecture notes (theoretical)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Railway vehicle structures 1.**				
2. Subject name in Hungarian	Vasúti járműszerkezetek 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ4F01-00**			**5. Term | role**	**4 | sp**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	28 hours	**Homework**	24 hours
Reading written materials	14 hours	**Midterm preparation**	20 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Tulipánt Gergely		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

To introduce railway specialization students to the basics and specifics of the construction, operation, and structure of railway vehicles and track/vehicle systems.

20. Programme of lectures

Classification an basic characteristics of railway vehicles and trains. Characteristics of railway tarck and track-vehicle connection. Excitation from the track. Dynamic effect of the curve and transmission curve tracks. Mechanics of the accelerating and the braking, speed-timing diagrams. Variation in axle-load. Motion of railway vehicles on straight an curved track. Running safety. Running comfort. Computation of the restricting of lateral geometry, of variation in axle-load, of the turn-force in curving.

21. Programme of practices

Basic calculations in railway engineering: calculation of vehicle running characteristics; narrowing calculation; deflection calculation; determining the change in wheel load during traction; flow chart calculation, calculation of suspension and damping characteristics.

22. Programme of laboratories

Basic calculations in railway engineering: calculation of vehicle running characteristics; narrowing calculation; deflection calculation; determining the change in wheel load during traction; flow chart calculation, calculation of suspension and damping characteristics.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the characteristics and main elements of railway vehicles.
2. Knows the basic connections of the track/vehicle system and their application possibilities.

b) skills (k)

1. Is able to navigate the system of physical concepts and units used in vehicle technology.
2. Is able to recognize and navigate in the field of specifics related to railway vehicles.
3. Is able to determine basic railway track/vehicle characteristics.

c) attitude (a)

1. has the attitude characterized by openness and receptiveness to new knowledge.
2. meets the expectations of engineering work – demanding, clear and precise.

d) autonomy and responsibility (o)

1. Takes the first step without waiting for what others say or do.
2. Expresses own opinion on issues related to railway vehicles.
3. Solves own task and controls it.
4. Takes responsibility for the correct documentation of the methods and procedures used.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. I. Term paper 2. II. Term paper 3. Semester assignment	1. ZH1 2. ZH2 3. F	1. 20% 2. 20% 3. 20%	1. t1,t2,k1-k3,a1,a2,o1-o4 2. t1,t2,k1-k3,a1,a2,o1-o4

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Exam	1. V	1. 40%	1. t1,t2,k1-k3,a1,a2,o1-o4

26. Criteria to obtain a signature / midterm grade

The end-of-year grade is the average of the grades of the two semester papers (which must account for the learning outcomes achieved during the semester, at least at an appropriate level) with a weight of 20% each, the exam with a weight of 40%, and the grade received for the semester assignment with a weight of 20%. A satisfactory grade is conditional on the full achievement of the expected learning outcomes!

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

According to the rules set out in the AER.

29. Retake and delayed completion

The midterm tests can be retaken separately, with one retake and one retake, and the exam can be retaken once. The semester assignment can be corrected.

30. Consultation

At a time and in a format agreed upon with the instructor.

31. Learning materials

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Railway vehicle structures 2.**				
2. Subject name in Hungarian	Vasúti járműszerkezetek 2.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ5F02-00**			**5. Term | role**	**5 | sp**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	28 hours	**Homework**	24 hours
Reading written materials	14 hours	**Midterm preparation**	28 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Tulipánt Gergely associate professor	**15. Email address**	tulipant.gergely@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Tulipánt Gergely, Krémer Miklós		
18. Indicative prerequisites	BMEKOVJBSJ4F01-00 Vasúti járműszerkezetek 1. recommended core, - - -, - - -		

19. Purpose

To introduce railway specialization students to the basics and specifics of the construction, operation, and structure of railway vehicles and track/vehicle systems.

20. Programme of lectures

Railway running gears. Construction and dimensioning of wheel sets. Layaut of runnig gear and spring suspension. Bogies. Buffers and draw gears. Brake systems of railway vehicles. Underframes and suoerstructures of railway cars and carriages. Internal equipment of passanger carriages. Heating, air conditioning and electric devices. Special freight car equipments. Special railway vehicles. Main characters of the braking of railway vehicles. Layut and operation of the mechanical-, pneumatical- and electro-mechanical brake systems. Block-, disc- and drum brake systems. Layout and dimensioning of the brake linkage. Hand brakes. Central brake valves, and brake valves for driver. Pneumatical load changeovers. Location of the brake devices in the vehicle. Electro-magnetic and eddy current track brakes. Anti-sleep systems. Heat-action and heating during the braking. Operation of the braking, compotation of the stoppint distance. Train formation on the basis of braking considerations. Braking of the long trains. Braking of the hight-speed trains. Longitudinal dynamics of braking.

21. Programme of practices

Strength control calculations for railway vehicle structures

22. Programme of laboratories

Strength control calculations for railway vehicle structures

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the characteristics and elements of railway vehicles.
2. Knows the basic relationships of the track/vehicle system and their application possibilities.
3. Knows the factors and forces determining the main motion of railway vehicles.
4. Knows the characteristics of the force transfer between the driven vehicle wheel and the supporting surface.
5. Knows the methods for solving the equations of motion of the vehicle.
6. Knows the parasitic motion forms of vehicles and their determination methods.
7. Knows the structure and operating principles of railway braking systems.

b) skills (k)

1. Is able to navigate the system of physical concepts and units used in vehicle technology.
2. Is able to recognize and navigate in the field of specifics related to railway vehicles.
3. Is able to determine basic railway track/vehicle characteristics.
4. Is able to recognize and determine basic kinetic and dynamic characteristics related to railway vehicles.

c) attitude (a)

1. has the attitude characterized by openness and receptiveness to new knowledge.
2. meets the expectations of engineering work – demanding, clear and precise.
3. is also independently interested in new technical solutions in the subject area.

d) autonomy and responsibility (o)

1. Takes the first step without waiting for what others say or do.
2. Expresses own opinion on issues related to railway vehicles.
3. Solves own task and controls it.
4. Takes responsibility for the correct documentation of the methods and procedures used.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. I. Term paper 2. II. Term paper 3. Semester assignment	1. ZH1 2. ZH2 3. F	1. 40% 2. 40% 3. 20%	1. t1-t7,k1-k4,a1-a3,o1-o4 2. t1-t7,k1-k4,a1-a3,o1-o4 3. t1, t3,k1,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The mid-term grade: the average of the grades of the two mid-term papers (in which the learning outcomes achieved during the semester must be reported, at least at an appropriate level) with a weight of 40% each and the grade received for the mid-term assignment with a weight of 20%. The condition for a satisfactory grade is the full fulfillment of the expected learning outcomes!

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 62-74%
Pass 50-61%
Fail 0-49%

28. Attendance and participation requirements

According to the rules set out in the AER.

29. Retake and delayed completion

The midterm test can be made up separately in the form of one make-up and one repeated make-up. The semi-annual assignment can be corrected.

30. Consultation

At a time and in a format agreed upon with the instructor.

31. Learning materials

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Reliability and safety**				
2. Subject name in Hungarian	Megbízhatóság és biztonság			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ7C01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	28 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Bartha Tamás associate professor	**15. Email address**	bartha.tamas@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Bartha Tamás, Dr. Baranyi Edit, Lövétei István Ferenc, Farkas Balázs		
18. Indicative prerequisites	BMEKOKJBSM2001-00 Elektrotechnika - elektronika recommended core, - - -, - - -		

19. Purpose

The aim of the course is to familiarise students with the assessment and management of the risks posed by the threats to road safety. It introduces the options and strategies for managing faults and achieving as well as maintaining safety. Provides insight into the development process of safety-critical traffic systems.

20. Programme of lectures

The purpose and place of traffic automation in the transport system. The role of vehicle control devices in creating and maintaining traffic safety. Sources of danger in traffic. The concept and calculation of risk in transport systems. The concept of technical safety, risk reduction, risk tolerance. The relationship between reliability and safety. Fault management and safety strategies. Development processes for safety critical systems. Safety integrity levels.

21. Programme of practices

The concept and parameters of dependability. Reliability of elements and systems. Methods to increase reliability. The concept and types of redundancy. Dependability of repairable systems. Availability. Comparison of different redundancy and repair methods. Reliability calculations. Reliability parameter calculations for serial, parallel and other reliability system structures. Markov models and calculations.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the key terminology, the key relationships and the theoretical background related to safety

b) skills (k)

1. can apply the principles and methods of analysis, calculation and modelling of safety-critical traffic systems
2. can assess threats to traffic systems, the risk they pose and their impact on safety
3. Students can identify faults in the traffic systems and select a strategy to deal with them
4. can apply basic safety engineering methods and solutions, designing a system architecture to meet specific requirements

c) attitude (a)

1. monitors the best practice, and the legislative, technical, technological and administrative changes in the field of safety critical traffic systems

d) autonomy and responsibility (o)

1. identifies technology gaps and process risks and initiates mitigating actions

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 1 2. midterm test 2	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,k1-k4,a1,o1 2. t1,k1-k4,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Successful (min. 50%) completion of the midterm tests.

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

The two midterms can be retaken during the semester or the late completion period.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

presentation slides, background material

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Resistance of ships**				
2. Subject name in Hungarian	Hajók ellenállása			**3. Programme**	j
4. Subject code	**BMEKORHBSJ4G01-00**			**5. Term | role**	**4 | sp**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	12 hours
Reading written materials	12 hours	**Midterm preparation**	0 hours	**Exam preparation**	14 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Hargitai L. Csaba senior lecturer	**15. Email address**	hargitai.laszlo.csaba@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba		
18. Indicative prerequisites	BMEKORHBSM3001-00 Hő- és áramlástan 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to familiarise students with the ship resistance calculation.

20. Programme of lectures

Flow and wave pattern around the ship. Floatation of ships during motion. Planing. Resistance of the ships. Methods for determination of resistance and thrust. Model testing.

21. Programme of practices

Determination of ship total resistance by different computation methods. Practicing on worked out example calculations.

22. Programme of laboratories

Determination of ship total resistance experimentally and by computer (computer laboratory).

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic physical rules about resistance of ships

b) skills (k)

1. is able to reproduce, adapt and interpret the resistance of ships in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework (making a resistance calculation and documentation)	1. F	1. 50%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1

26. Criteria to obtain a signature / midterm grade	27. Grading rules
submission of assignments on time or on lessons	Excellent 88-100% Good 75-87% Satisfactory 63-74% Pass 50-62% Fail 0-49%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
Second retake from the homework.	

30. Consultation
at a time and in a form agreed with the teacher
31. Learning materials
Lecture slides, electronic course material and template drawings Literature (in English)
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Sensors and actuators**				
2. Subject name in Hungarian	Érzékelők és beavatkozók			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ4C01-00**			**5. Term | role**	**4 | sp**
6. Credits	**5**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	49 hours	**Midterm preparation**	31 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Aradi Szilárd associate professor	**15. Email address**	aradi.szilard@kjk.bme.hu
16. …organisational unit	Department of Control for Transport and Vehicle Systems		
17. Instructor(s)	Dr. Aradi Szilárd, Dr. Soumelidis Alexandros		
18. Indicative prerequisites	BMEKOKJBSM2001-00 Elektrotechnika - elektronika recommended core, - - -, - - -		

19. Purpose

The aim of the course is to develop a comprehensive systems-oriented perspective in which measurement, signal processing, and control are understood and applied as an integrated whole.

20. Programme of lectures

The aim of the lectures is to provide a theoretical foundation for understanding the key concepts and methods related to sensing, signal processing, and control in mechatronic systems. The first part of the course covers the basics of analog and digital measurement techniques, the effects of measurement errors and noise, as well as the theory of sampling, quantization, and analog-to-digital conversion. The operation of sensors commonly used in mechatronic systems is introduced, with a focus on temperature, pressure, force, torque, and MEMS-based inertial sensors. This is followed by the mathematical fundamentals of signal processing, including filtering, noise reduction, spectral analysis, and digital filters (FIR, IIR). In the second part of the course, the operation and control principles of electrical actuators—particularly DC, BLDC, PMS, AC, and stepper motors—are discussed. Through modeling and control strategies, the course presents methods for implementing position and speed control in microcontroller-based systems. The lectures aim to give students a comprehensive understanding of the entire measurement and control chain in modern mechatronic systems.

21. Programme of practices

The aim of the practice sessions is to apply the theoretical knowledge gained during the lectures to real-world mechatronic problems. Students start with basic measurement tasks, working with different sensors (e.g., temperature, pressure, inertial) to perform signal conditioning and data acquisition in a microcontroller-based environment. They then carry out sampling, A/D conversion, and implement digital filters in real time. During the sessions, students also develop and test signal processing algorithms—such as simple decision-making, estimation, and filtering procedures—on microcontroller platforms. In the second half of the semester, the focus shifts to motor control: students implement speed and position control for DC motors and explore the control of BLDC, PMS, and stepper motors using various circuit solutions. The connection between control system design in Matlab and microcontroller-based implementation is also emphasized. The goal of the practical work is to integrate sensing, signal processing, and actuation into a functional mechatronic system.

22. Programme of laboratories

The aim of the laboratory sessions is to deepen and organize the knowledge acquired during the exercises through more complex, real-world vehicle mechatronics measurement tasks. Working in small groups, students learn the precise execution of measurement procedures, data collection, and the proper preparation of measurement reports. During the labs, they apply various sensors, signal processing methods, and motor control techniques in a microcontroller-based environment. A key focus of the sessions is to develop teamwork, strengthen engineering thinking, and enhance practical skills.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understands the theoretical foundations of measurement, signal processing, and control methods used in vehicle mechatronic systems.

2. Has insight into the operation of various sensors, data acquisition steps, and the principles of analog and digital signal processing.
3. Possesses the knowledge required for modeling and controlling electric motors.
4. Is familiar with the possibilities of microcontroller-based implementation.

b) skills (k)

1. Able to design and implement measurement and control tasks in a microcontroller environment.
2. Applies digital signal processing techniques (e.g., filtering, estimation, decision-making) in real-time systems.
3. Capable of controlling and regulating various types of electric motors (DC, BLDC, PMS, AC, stepper).
4. Analyzes the behavior of vehicle mechatronic systems and evaluates control performance both in simulation and in real applications.

c) attitude (a)

1. Open to applying modern measurement and control technologies.
2. Strives to implement precise, reliable, and efficient systems.
3. Shows interest in the interdisciplinary connections between sensing, signal processing, and control.
4. Committed to systems-oriented and integrated thinking.

d) autonomy and responsibility (o)

1. Capable of independently solving complex sensing and control tasks.
2. Takes responsibility for the operation, reliability, and quality of the designed systems.
3. Demonstrates initiative in system design and debugging tasks.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 1. 2. midterm test 2.	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,t2,k1,k2,a1-a4,o1-o3 2. t3,t4,k3,k4,a1-a4,o1-o3

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Students are required to complete midterm tests during the semester. To earn a midterm grade, each test must be passed with a minimum grade of 2 (sufficient).

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is allowed for both midterm requirements (two midterm tests).

27. Grading rules

0%-50%: fail; 51%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent

30. Consultation

After prior arrangement, meetings are possible at any time during the semester, both in person and online.

31. Learning materials

Lecture slides, electronic course material and exercise book

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Ship construction**				
2. Subject name in Hungarian	Hajóépítés			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6G01-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	10 hours	**Homework**	0 hours
Reading written materials	48 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Hargitai L. Csaba senior lecturer	**15. Email address**	hargitai.laszlo.csaba@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba		
18. Indicative prerequisites	BMEKORHBSJ6G02-00 Hajószerkezettan recommended coherent, - - -, - - -		

19. Purpose

20. Programme of lectures

Structure and organisation of shipyards. Special requirements of technologies of shipyards.

Loftwork. Model fabrication and shell expansion. Material handling. Pate and section preparation. Prefabrication in workshops, manufacturing of sections. Cutting, bending and embossing technologies. Welding technology. Works on slipway. Technologies for watertight check of joints. Shaft laying technology. Painting and corrosion protection. Launching works.

Manufacturing by bank. Ship repair. Ship tests. The role of classification associations during shipbuilding.

21. Programme of practices

Solving and practicing numerical examples necessary for the acquisition of the theoretical part of the curriculum.

Shipyard visits.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the ship construction technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the steps and measures of ship construction in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 100%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake from the midterm test.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Ship electronics systems**				
2. Subject name in Hungarian	Hajó-elektronikai rendszerek			**3. Programme**	j
4. Subject code	**BMEKORHBSJ7G01-00**			**5. Term | role**	**7 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	**Preparation for lessons**	15 hours	**Homework**	0 hours
Reading written materials	24 hours	**Midterm preparation**	23 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Hargitai L. Csaba senior lecturer	**15. Email address**	hargitai.laszlo.csaba@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to familiarize students with the electronic systems used in shipping.

20. Programme of lectures

Onboard power supply and power distribution systems. Fundamentals of ship automation

Electronic navigation and communication equipment. Design considerations for integrated bridge and deck systems. Integration of electronic systems into the ship structure. Safety and redundancy factors in the design of electronic systems. Application of standards and regulations

21. Programme of practices

Solving and practicing numerical examples necessary for the acquisition of the theoretical part of the curriculum.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the electronic systems of ships

b) skills (k)

1. is able to reproduce, adapt and interpret the content of ship electronics systems in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test	1. ZH	1. 100%	1. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
successful (min. 50%) completion of the midterm test	Excellent 88-100% Good 75-87% Satisfactory 63-74% Pass 50-62% Fail 0-49%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
Second retake from the midterm test.	

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Ship machinery**				
2. Subject name in Hungarian	Hajógépek			**3. Programme**	j
4. Subject code	**BMEKORHBSJ5G01-00**			**5. Term | role**	**5 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	**Preparation for lessons**	14 hours	**Homework**	15 hours
Reading written materials	15 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba, Dr. Simongáti Győző		
18. Indicative prerequisites	BMEKORHBSJ5001-00 Járművek hő- és áramlástech. berendezései 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to familiarise students with the main and auxiliary power systems of ships.

20. Programme of lectures

Typical drive-train systems. Main engine types in general. Criteria for selecting the drive train system. Main characteristics of marine diesel engines, gas cycle processes, performance and efficiency, structural design and characteristic curves. Suction, charge and injection systems, auxiliary and starter equipment, fuel consumption, environmental pollution and protection. Construction details of diesel engines.

Typical gearbox designs. Gearbox, thrust bearing types. Elements of the shaft system. Design of the stern tube. Stern tube bearings.

Types of Auxiliary Machines. Control of the main and auxiliary plant.

21. Programme of practices

Design of a main machinery system of a vessel, selecting the parts of the system, drawing a scheme.

22. Programme of laboratories

Hull-Engine-Propeller interaction simulation with software.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the ship machinery technologies and processes

b) skills (k)

1. is able to reproduce, adapt and interpret the operation of ship machinary in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework (specification and drawing of propulsion system)	1. ZH 2. F1	1. 75% 2. 25%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

submission of assignments on time or on lessons and successful (min. 50%) completion of the midterm test

27. Grading rules

Excellent 88-100%
Good 75-87%
Satisfactory 63-74%
Pass 50-62%
Fail 0-49%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is only from one midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, electronic course material and template drawings
Literature (in English)

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Ship structures**				
2. Subject name in Hungarian	Hajószerkezettan			**3. Programme**	j
4. Subject code	**BMEKORHBSJ6G02-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	18 hours	**Homework**	20 hours
Reading written materials	16 hours	**Midterm preparation**	24 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Aeronautics and Naval Architecture		
14. Subject coordinator and its position	Dr. Simongáti Győző associate professor	**15. Email address**	simongati.gyozo@kjk.bme.hu
16. …organisational unit	Department of Aeronautics and Naval Architecture		
17. Instructor(s)	Dr. Hargitai L. Csaba, Dr. Simongáti Győző		

18. Indicative prerequisites	BMEKORHBSJ3001-00 Mechanika 2. recommended core, - - -, - - -

19. Purpose

The aim of the course is to introduce the main aspects of the structural design of ships.

20. Programme of lectures

Shipbuilding materials. Midship section types. The most important structural elements. Models of hull strength. Framing systems. The forces acting on the ship. The concept of longitudinal strength and its calculation methods. Local stresses. Bulkhead strength. Classification society regulations. Verification of the conformity of structural elements according to regulations. Calculation of cross section inertia of a midship section.

21. Programme of practices

Verification of the conformity of structural elements according to regulations. Calculation of cross section inertia of a midship section.

22. Programme of laboratories

Drawing of ship structures in 2D and 3D. Longitudnial strength calculation by using a dedicated software.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic physical rules about ship structures

b) skills (k)

1. is able to reproduce, adapt and interpret the technologies of ship structures in a meaningful way
2. is able to communicate the ideas and plans about ships clearly and visually to others

c) attitude (a)

1. strives for completeness in the acquisition of knowledge, cooperates with the instructor and fellow students, is empathetic and tolerant towards members of the team
2. is receptive and proactive in the performance of the tasks assigned to itself, self-critical towards the assigned tasks

d) autonomy and responsibility (o)

1. comply with and enforce environmental and social standards in their chosen field of work, and are able to self-monitor and correct errors independently, while listening to the professional opinions of others
2. makes responsible decisions in solving tasks in the chosen field of activity, formulating independent proposals to solve the challenges identified

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework (midship section drawing)	1. ZH 2. F1	1. 60% 2. 40%	1. t1,k1,k2,a1,a2,o1,o2 2. t1,k1,k2,a1,a2,o1,o2

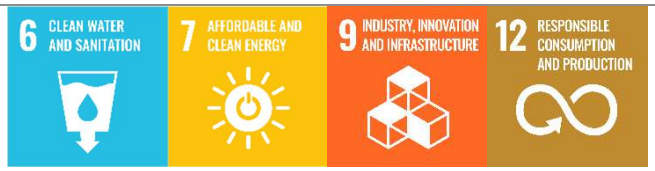
25. Exams			
Name	**Code**	**Share in final grade**	**Evaluated learning outcomes**
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
submission of assignments on time or on lessons and successful (min. 50%) completion of the midterm test	Excellent 88-100% Good 75-87% Satisfactory 63-74% Pass 50-62% Fail 0-49%
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
Second retake or delayed completion is only from one midterm requirement.	

30. Consultation
at a time and in a form agreed with the teacher
31. Learning materials
Lecture slides, electronic course material and template drawings Literature (in English)
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Technical chemistry**				
2. Subject name in Hungarian	Műszaki kémia			**3. Programme**	jkl
4. Subject code	**BMEVEKTAKO1**			**5. Term | role**	**1 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	11 hours	**Homework**	3 hours
Reading written materials	20 hours	**Midterm preparation**	4 hours	**Exam preparation**	10 hours

13. Organisational unit in charge	Department of Chemical and Environmental Process Engineering (VBK)		
14. Subject coordinator and its position	Haáz Enikő tanszéki mérnök	**15. Email address**	haaz.eniko@vbk.bme.hu
16. …organisational unit	Department of Chemical and Environmental Process Engineering (VBK)		
17. Instructor(s)	Haáz Enikő		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

The aim of the course is to provide students with fundamental chemical knowledge related to energy production, technical fluids, and structural materials, and to apply this knowledge in practice. Students will gain insight into the chemistry of energy carriers, fuels, water treatment, lubricants, corrosion protection, and electrochemical power sources, along with relevant laboratory testing methods.

20. Programme of lectures

An overview of general chemistry knowledge to understand the curriculum. Chemical aspects of energy production, environmental issues: Basic concepts of combustion technology, Coal (in brief), Petroleum and natural gas as energy and chemical raw materials (overview), Properties of motor fuels, production, combustion, exhaust gas cleaning, Principle of nuclear energy release, nuclear reactors (in brief), Characterization of alternative energy sources (in general), Alternative motor fuels, Chemical power sources (galvanic cells, batteries, fuel cells). Technical fluids: Characterization, preparation, wastewater and treatment of waters used in industrial practice, Characterization, production, grouping, wear of lubricants (mainly motor oils). Chemistry of structural materials: General properties of structural materials, Main types of ceramics, their properties, Structure and properties of metals, production (in brief), corrosion and corrosion protection of major metals, metals, Characterization of macromolecules, main types, properties of plastics, their production (in brief).

21. Programme of practices

.

22. Programme of laboratories

Catalytic cleaning of Otto engine exhaust, engine energy balance, Ion exchange water treatment, Lubricants (engine oils and machine greases), Electrochemistry (chemical power sources, electrolysis), Corrosion of metals

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the basic thermodynamic laws of chemical transformations, electrochemical relations related to electrochemical corrosion, (J,K,L:T7)
2. is familiar with the content, context and environmental impact of basic technical terms related to combustion technology, (J,K,L:T2)
3. knows the types of crude oil and the names of the fractions that can be obtained from them, the most important properties of each type of fuel and lubricant (J,K,L:T7)
4. is familiar with drinking water and wastewater treatment sub-technologies (J,K,L:T7)

b) skills (k)

1. is able to detect the possibility of electrochemical corrosion and intervene in the case of metallic structural materials, (J,K,L:K10,K17;J:36;K:28;L:31)
2. is able to assess the energy content and quality of each fuel and lubricant, the technical consequences of their use and the environmental impact, (J,K,L:K10,K17;J:36;K:28;L:31)

3. is able to perform simpler operational tasks with the knowledge of wastewater and drinking water treatment procedures. (J,K,L:K10,K17;J:36;K:28;L:31)

c) attitude (a)

1. cooperates with the lecturer and fellow students in expanding the knowledge, expands his / her knowledge by continuous acquisition of knowledge,

2. open to the use of information technology tools, sensitive to environmental issues,

3. strives for the accurate and error-free solution of tasks, in its work it purposefully co-operates with experts in border area topics. (J,K,L:A2)

d) autonomy and responsibility (o)

1. solves tasks and problems independently or together with experts in other fields, openly receives well-founded critical remarks (J,K,L:O3)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. laboratory measurements' reports 2. midterm test 3. optional: five homeworks issued on lectures	1. LJ 2. ZH 3. FHF	1. 30% 2. 0% 3. 0%	1. t1-t4,k1-k3,a1-a3,o1 2. t1-t4,k1-k3 3. k1-k3,a1-a3,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 70%	1. t1-t4,k1-k3,a1-a3,o1

26. Criteria to obtain a signature / midterm grade

Required: Write a report on laboratory measurements. Optional: 5 homework assignments issued at the lecture, chemical calculation related to the curriculum (max. 5 * 2 extra points), independent processing of the topic related to the material in a dissertation, max. 20 extra points. One grade (score) in each lab. Conditions for admission to the exam: at least 50% midterm test and max. at least 50% of the laboratory score, or the max. at least 60% of the laboratory score.

27. Grading rules

0%-45%: fail; 46%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

One midterm test can be re-taken once in the study period or in the delayed completion week.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Written materials (on the intranet)
Műszaki kémia gyakorlatok (in Hungarian), Műegyetemi Kiadó, 71018
Recommended readings: Berecz: Kémia műszakiaknak (in Hungarian), Nemzeti Tankönyvkiadó, 1998
Vajta-Szebényi-Czencz: Általános kémiai technológia (in Hungarian), Nemzeti Tankönyvkiadó, 1999
Bajnóczy-Szebényi: Műszaki kémia (in Hungarian), Műegyetemi Kiadó, 2001

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Technological diagnostics**				
2. Subject name in Hungarian	Technológiai diagnosztika			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6D02-00**			**5. Term | role**	**6 | sp**
6. Credits	**3**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	25 hours	**Homework**	0 hours
Reading written materials	8 hours	**Midterm preparation**	15 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Hlinka József senior lecturer	**15. Email address**	hlinka.jozsef@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Hlinka József, Dr. Dömötör Ferenc, Dr. Bánlaki Pál		
18. Indicative prerequisites	BMEKOGJBSJ3001-00 Gyártástechnológia recommended core, - - -, - - -		

19. Purpose

This university course provides comprehensive knowledge in vehicle technical diagnostics, starting with fundamental concepts, fault detection objectives and methodologies, as well as vehicle inspection techniques aimed at ensuring traffic safety and cost-effective operation. The curriculum thoroughly covers the foundations of technical diagnostics, presenting various diagnostic methods and their associated tools' operational principles and usage characteristics—including visual inspection techniques (such as photo and video analysis, high-speed camera recordings, endoscopy), thermographic inspection, vibration analysis, acoustic emission testing, and ultrasonic flaw detection. Furthermore, the course addresses expert diagnostic systems used in vehicle diagnostics and the methodology for evaluating and professionally documenting test results. In addition to theoretical knowledge, the course includes hands-on exercises using industrial-grade diagnostic equipment, enabling students to master the application of modern vehicle diagnostic techniques in real-world conditions.

20. Programme of lectures

The course covers fundamental concepts; fault detection objectives and methodologies; vehicle inspections to ensure traffic safety, reliable and cost-effective operation; principles of technical diagnostics; various diagnostic methods and their corresponding tools - including photo/video analysis, high-speed cameras, endoscopy, thermography, vibration analysis, acoustic emission testing, and ultrasonic flaw detection for typical inspection scenarios; automotive expert diagnostic systems; and the evaluation/documentation of test results.

21. Programme of practices

Vibration diagnostics, endoscopy, thermovision, ultrasonic troubleshooting, engine diagnostics, running gear test, brake performance test, shock absorber test.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the diagnostic systems applied in technical practice, including knowledge of condition-based maintenance.

2. Knows the reliable prediction of machinery lifespan, ultrasonic testing methods, thermographic inspection techniques, vibration diagnostics, and the application possibilities of high-speed camera analysis in industrial diagnostics.

b) skills (k)

1. By applying the above knowledge and related professional expertise, is capable of contributing to solving tasks in automated manufacturing systems.

c) attitude (a)

1. Is aspired to always give the maximum of your abilities, to work accurately and error-free.

2. Strives to comply with accident prevention rules and to cooperate with colleagues.

d) autonomy and responsibility (o)

1. feels responsible for setting an example to the peers with the quality of the work and the observance of ethical standards, responsibly applying the knowledge acquired during the subject.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 50% 2. 50%	1. t1,t2,k1,a1,a2,o1 2. t1,t2,k1,a1,a2,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

Passing the midterm tests.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm tests can be retaken twice.

30. Consultation

Every lecture

31. Learning materials

Pál Bánlaki, Ferenc Dömötör, József Hlinka, Attila Szabó, János Takács, Balázs Vehovszky, Zoltán Weltsch: Diagnostics of vehicle manufacturing processes, Akademia Publishers, Bp. 2019.
Ferenc Dömötör, Károly Sólyomvári, Zoltán Weltsch, Balázs Vehovszky, Vehicle Diagnostics, www.tankonyvtar.hu, 2012.
Vibration Diagnostics (Ed. Dr. Dömötör F.), College Publisher, Dunaújváros, 2007.
Maintenance Manual. (Ed.: Dr. Z. Gaál, Dr. K. Sólyomvári), RAABE Consulting and Publishing Ltd. 2003.
Nagy, Baksai, Sólyomvári: Technical Diagnostics (Thermography) Delta3N Ltd., 2007.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle and drive elements 1.**				
2. Subject name in Hungarian	Jármű- és hajtáselemek 1.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ4001-00**			**5. Term | role**	**4 | k**
6. Credits	**6**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**3 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	70 hours	**Preparation for lessons**	20 hours	**Homework**	40 hours
Reading written materials	14 hours	**Midterm preparation**	36 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Lovas László associate professor	**15. Email address**	lovas.laszlo@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Lovas László, Dr. Török István, Devecz János, Győri Márk		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

Explaining future engineers the simple machine elements applied in vehicles

20. Programme of lectures

Classification of vehicle structure elements. Structural material properties. Fatigue. Load models, load carrying capacity parameters. Basics of dimensioning. Bolted links, bolted link behavior under pretension. Dimensioning of welded structures and weldings. Principles of welded constructions. Basics of adhesive links. Hub-shaft links with shape closing and force closing. Construction principles, dimensioning. Spring types. Coil springs, stiffness diagrams. Clutch types. Special clutches in vehicle industry. Power transmission of a friction clutch. Basics of tribology. Principle and construction of journal bearings.

21. Programme of practices

Practice by solving individual machine construction problems.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the national and international requirements, regulations, and guidelines to ensure that products, services and processes are of good quality and fit for purpose. (T9)
2. Knows the concepts and problem solving methods in the field of vehicles and mobile machines. (T10)
3. Knows the basic design principles, methods, models, quality systems, regulations and standards used in automotive engineering, manufacturing technology, control procedures and operational processes. (T15)

b) skills (k)

1. Able to read and interpret technical drawings and documentation prepared by other engineers (K13)
2. Able to build, repair, model, or operate a product from a technical drawing or technical documentation. (K14)
3. Creates technical plans and drawings using special software. (K18,S1)
4. Able to interpret and characterise the construction and operation of the structural units and components of vehicles and mobile machines, the design and interconnection of the system components used (K22)
5. Able to apply the technical specifications related to the operation of vehicle systems and mobile machines, the principles and economic context of the adjustment and operation of machines and mechanical equipment. (K23)
6. Able to identify, formulate and solve routine technical problems (K26)
7. Able to apply the acquired IT knowledge to the solution of tasks in the field of vehicles and mobile machines (K29)
8. Uses computer-aided design software. (K45)

c) attitude (a)

1. Monitors legislative, technical, technological and administrative changes in the field. (A16)
2. Open to learn about, adopt and authentically communicate professional, technological development and innovation in the field of vehicles and mobile machines. (A17)

d) autonomy and responsibility (o)

1. Identifies the shortcomings of the technologies used, the risks of the processes and initiates measures to reduce them. (O14)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. homework 3. midterm test	1. HF1 2. HF2 3. ZH	1. 33% 2. 33% 3. 34%	1. t1-t3,k1-k8,a1,a2,o1,o2 2. t1-t3,k1-k8,a1,a2,o1,o2 3. t1-t3,k1,k2,k4,k6,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade

The midterm test and both homeworks written during the semester are evaluated by a point system, the sum of which results in the semester mark; the semester mark is determined on the basis of the semester points.

The conditions for obtaining a semester mark are:

- attendance of 70% of the practice classes;
- 40% of the sum of test points;
- each homework is submitted and accepted;
- the sum of the homeworks and midterm test points reaches 40% of the total.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Retake test.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides, presentation and practice videos, lecture notes, exercise book

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle and drive elements 2.**				
2. Subject name in Hungarian	Jármű- és hajtáselemek 2.			**3. Programme**	j
4. Subject code	**BMEKOVJBSJ5001-00**			**5. Term | role**	**5 | k**
6. Credits	**3**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	42 hours	**Preparation for lessons**	5 hours	**Homework**	18 hours
Reading written materials	5 hours	**Midterm preparation**	10 hours	**Exam preparation**	10 hours

13. Organisational unit in charge	Department of Railway Vehicles and Vehicle System Analysis		
14. Subject coordinator and its position	Dr. Lovas László associate professor	**15. Email address**	lovas.laszlo@kjk.bme.hu
16. …organisational unit	Department of Railway Vehicles and Vehicle System Analysis		
17. Instructor(s)	Dr. Lovas László, Dr. Török István, Devecz János		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

Explaining future engineers the complex machine elements applied in vehicles

20. Programme of lectures

Classification of vehicle structure elements.

Rolling bearing. Types of rolling bearing. Bearing design considerations, bearing selection and installation.

Types of gear drive pairs, main characteristics and parameters. Basic properties and characteristics of involute gearing: gearing systems. Cylindrical gears. Power and torque characteristics. Gear failure modes, principles of gear sizing.

Physical principles of operation of belt drives, parameters, forces, torques. V-belt, toothed belt and chain drives.

21. Programme of practices

Practice by solving individual machine construction problems.

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the national and international requirements, regulations, and guidelines to ensure that products, services and processes are of good quality and fit for purpose. (T9)
2. Knows the concepts and problem solving methods in the field of vehicles and mobile machines. (T10)
3. Knows the basic design principles, methods, models, quality systems, regulations and standards used in automotive engineering, manufacturing technology, control procedures and operational processes. (T15)

b) skills (k)

1. Able to read and interpret technical drawings and documentation prepared by other engineers (K13)
2. Able to build, repair, model, or operate a product from a technical drawing or technical documentation. (K14)
3. Creates technical plans and drawings using special software. (K18,S1)
4. Able to interpret and characterise the construction and operation of the structural units and components of vehicles and mobile machines, the design and interconnection of the system components used (K22)
5. Able to apply the technical specifications related to the operation of vehicle systems and mobile machines, the principles and economic context of the adjustment and operation of machines and mechanical equipment. (K23)
6. Able to identify, formulate and solve routine technical problems (K26)
7. Able to apply the acquired IT knowledge to the solution of tasks in the field of vehicles and mobile machines (K29)
8. Uses computer-aided design software. (K45)

c) attitude (a)

1. Monitors legislative, technical, technological and administrative changes in the field. (A16)
2. Open to learn about, adopt and authentically communicate professional, technological development and innovation in the field of vehicles and mobile machines. (A17)

d) autonomy and responsibility (o)

1. Identifies the shortcomings of the technologies used, the risks of the processes and initiates measures to reduce them. (O14)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. homework 3. midterm test	1. HF1 2. HF2 3. ZH	1. 33% 2. 33% 3. 16%	1. t1-t3,k1-k8,a1,a2,o1,o2 2. t1-t3,k1-k8,a1,a2,o1,o2 3. t1-t3,k1,k2,k4,k6,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	1. 17%	1. t1-t3,k1,k2,k4,k6,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

The midterm test and both homeworks written during the semester are evaluated by a point system, the sum of which results in the semester points.

The conditions for obtaining a semester signature:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homeworks and the midterm test point reaches 40% of the total.

27. Grading rules

Excellent 80-100%
Good 68-79%
Satisfactory 54-67%
Pass 40-53%
Fail 0-39%

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

One retake test for those who did not make the test.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Presentation slides, presentation and practice videos, lecture notes, exercise book

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle control 1.**				
2. Subject name in Hungarian	Járműirányítás 1.			3. Programme	j
4. Subject code	**BMEKOKJBSJ5C02-00**			5. Term | role	**5 | sp**
6. Credits	**4**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**0 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	5 hours
Reading written materials	53 hours	Midterm preparation	12 hours	Exam preparation	0 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Gáspár Péter professor	15. Email address	gaspar.peter@kjk.bme.hu
16. …organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Gáspár Péter, Dr. Németh Balázs, Dr. Hegedűs Tamás, Dr. Fényes Dániel, Lelkó Attila		

18. Indicative prerequisites	- - -, - - -, - - -

19. Purpose

Learning about the modeling tasks of vehicles and mobile machines, and understanding control design principles based on the theoretical background.

20. Programme of lectures

Methods of vehicle dynamics analysis, modeling paradigms. Basics of model identification. Modeling for control purposes in vehicle dynamics tasks. Formalized description of vehicle requirements. Consideration of actuators and sensors in vehicle control. Analysis of the effect of vehicle maneuvers (turning, evading, acceleration, braking, ascent, descent). Dynamic analysis of progress in a platoon or formation. Overview of control methods, state-space and combinatorical controls. Realization of the designed control.

21. Programme of practices

Solving problems detailed in lectures, through examples in a simulated environment

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

Knows the methods of vehicle dynamics analysis and paradigms of modelling.

b) skills (k)

Understands the control modeling for a given vehicle dynamics task.

c) attitude (a)

He/she is interested in the analysis of effects of vehicle maneuver.

d) autonomy and responsibility (o)

He/she can independently realize a vehicle control problem.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 1. 2. midterm test 2. 3. homework	1. ZH1 2. ZH2 3. HF	1. 40% 2. 40% 3. 20%	1. t1,k1 2. t1,k1 3. a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes

-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Both midterm tests must result in at least a grade of 2, and the homework must be submitted during the semester (in three parts with different deadlines).	0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
There is one retake option for the midterm till the end of delayed completion period. Homework submission is possible until the end of the delayed completion period.	

30. Consultation
After prior arrangement, meetings are possible at any time during the semester, both in person and online.
31. Learning materials
Gáspár, P., Németh, B., Bokor, J.: Járműirányítás (in Hungarian)
32. Start of validity for the subject decription
September 1st, 2025

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

Subject description

1. Subject name	**Vehicle control 2.**				
2. Subject name in Hungarian	Járműirányítás 2.			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ6C02-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**0 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	25 hours	**Midterm preparation**	15 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Gáspár Péter professor	**15. Email address**	gaspar.peter@kjk.bme.hu
16. …organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Gáspár Péter, Dr. Németh Balázs, Dr. Hegedűs Tamás, Dr. Fényes Dániel, Lelkó Attila		

18. Indicative prerequisites	BMEKOKJBSJ5C02-00 Járműirányítás 1. recommended core, BMEKOKJBSM4001-00 Irányítástechnika recommended core, - - -

19. Purpose

Understanding specific vehicle control problems of vehicles and mobile machines and exploring possible solutions, with particular attention to the automation of road vehicles.

20. Programme of lectures

Overview of vehicle control tasks. Investigation of road vehicle interventions: braking (ABS / ESP), engine control, drive (ASR), steering, chassis suspension. Railway vehicle control problems: drive, non-slip braking. Aircraft control: climb, descent, turn. Robot pilot design considerations. Control tasks of robots and unmanned vehicles. Control principles for hybrid vehicles. Integrated steering design: chassis steering, adaptive cruise control.

21. Programme of practices

Solving problems detailed in lectures, through examples in a simulated environment

22. Programme of laboratories

-

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

Knows the basics of vehice conrol model identification.

b) skills (k)

Is able to apply the calculation, modelling principles and methods related to vehicle.

c) attitude (a)

He/she is interested in the control problems of different transport means.

d) autonomy and responsibility (o)

He/she can design integrated vehicle control.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. homework	1. ZH 2. HF	1. 30% 2. 20%	1. t1,k1 2. a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	0,5	1. t1,k1,a1,o1

26. Criteria to obtain a signature / midterm grade	27. Grading rules
The midterm test must result in at least a grade of 2, and the homework must be submitted during the semester (in three parts with different submission deadlines).	0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent
28. Attendance and participation requirements	
according to the rules of CoS	
29. Retake and delayed completion	
There is a retake option for the midterm till the end of delayed completion period. Homework submission is possible until the end of the delayed completion period.	
30. Consultation	
After prior arrangement, meetings are possible at any time during the semester, both in person and online.	
31. Learning materials	
Gáspár, P., Németh, B., Bokor, J.: Járműirányítás (in Hungarian)	
32. Start of validity for the subject decription	
September 1st, 2025	

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

Subject description

1. Subject name	**Vehicle manufacturing processes 1.**				
2. Subject name in Hungarian	Járműgyártás folyamatai 1.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ4D02-00**			**5. Term | role**	**4 | sp**
6. Credits	**8**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**240 hours**
Contact hours	84 hours	**Preparation for lessons**	30 hours	**Homework**	30 hours
Reading written materials	36 hours	**Midterm preparation**	30 hours	**Exam preparation**	30 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Markovits Tamás associate professor	**15. Email address**	markovits.tamas@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Bán Krisztián, Dr. Markovits Tamás, Dr. Vehovszky Balázs, Dr. Varga Ferenc László		

18. Indicative prerequisites	BMEKOGJBSJ2001-00 Anyagismeret és anyagtechnológia recommended core, - - -, - - -

19. Purpose

The aim of the course is to deepen the knowledge of metal forming technologies and various automotive bonding technologies among the processes of vehicle manufacturing.

20. Programme of lectures

Topics of the presentation: basic principles of metal forming, mechanical cutting of sheets, cutting, punching, bending and deep drawing and presentation of their main characteristics. Within joining technologies, mechanical joints, glued joints and their characteristics. Welding and related technologies (thermal and beam cutting processes, arc welding processes and their characteristics).

21. Programme of practices

During the internship, semi-annual homework assignments related to metal forming and welding technology will be given, during which the practical application of the theoretical material can be mastered.

22. Programme of laboratories

In the field of metal forming, students participate in laboratory visits, where they can observe the various processes and characteristics learned in theory. In the field of welding and related technologies, there are laboratory visits related to thermal and radial cutting, and welding as a technological process can be learned in practice.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knows the theoretical background of metal forming, the tools of the main processes, their operation, the main process characteristics and the basic relationships with the output characteristics.

2. Knows the process of thermal and beam cutting, its main system elements.

3. Knows the principle of the main welding processes, system elements and relationships, the welding process and the main influencing factors.

b) skills (k)

1. Is able to operate the system elements and processes of the described procedures and participate in solving minor problems in a value-creating manner.

c) attitude (a)

1. Is open to new opportunities and solutions in the field.

d) autonomy and responsibility (o)

1. Participates responsibly in tasks and processes.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. mindterm exam 2. homework 1 3. homework 2	1. ZH 2. HF1 3. HF2	1. 20% 2. 15% 3. 15%	1. t1-t3,k1,a1,o1 2. t1-t3,k1,a1,o1 3. t1-t3,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. Vizsg1	1. 50%	1. t1-t3,k1,a1,o1

26. Criteria to obtain a signature / midterm grade

During the semester 1 midterm test has to be completed with at least 50 % of the maximal points. In the semester participation in labs is mandatory and the planning task is required to be delivered to an acceptable level. The condition of the signature is the correspondingly qualified midterm exam, fulfilment of all lab activities and task submission.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

The midterm test and the semester assignment can be retaken once.

30. Consultation

Consultation is possible at a pre-arranged time.

31. Learning materials

Presentation slides and notes.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle manufacturing processes 2.**				
2. Subject name in Hungarian	Járműgyártás folyamatai 2.			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ5D01-00**			**5. Term | role**	**5 | sp**
6. Credits	**6**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**2 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**180 hours**
Contact hours	84 hours	**Preparation for lessons**	25 hours	**Homework**	45 hours
Reading written materials	10 hours	**Midterm preparation**	5 hours	**Exam preparation**	11 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Varga Ferenc László senior lecturer	**15. Email address**	varga.ferenc.laszlo@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Dr. Takács János, Dr. Markovits Tamás, Dr.Hlinka József, Dr. Herczeg Szabolcs, Dr. Dömötör Ferenc		
18. Indicative prerequisites	BMEKOGJBSJ3001-00 Gyártástechnológia recommended core, BMEKOGJBSJ4D02-00 Járműgyártás folyamatai 1. recommended complementary, - - -		

19. Purpose

The course provides engineering-focused knowledge and practical foundations for vehicle and component manufacturing/repair processes, covering machining and precision surface treatment technologies along with their associated equipment, tools, devices, and their productive, cost-effective operation. It examines manufacturing technologies for vehicle components and the fundamentals of process planning. Key topics include machining technologies, operational characteristics of specialized tools, material selection, tool refurbishment, and design principles. Tool management systems are addressed alongside the role of fixtures in vehicle production - detailing their construction, alignment, clamping, and fastening methods, plus fundamentals of machining fixture design and CNC applications. The curriculum also covers plant installation objectives, factory layout design principles, investment strategies, Lean manufacturing characteristics, and the design of machining, welding, stamping, and assembly plants.

20. Programme of lectures

The lectures provides engineering-focused knowledge and practical foundations for vehicle and component manufacturing/repair processes, covering machining and precision surface treatment technologies along with their associated equipment, tools, devices, and their productive, cost-effective operation. It examines manufacturing technologies for vehicle components and the fundamentals of process planning. Key topics include machining technologies, operational characteristics of specialized tools, material selection, tool refurbishment, and design principles. Tool management systems are addressed alongside the role of fixtures in vehicle production - detailing their construction, alignment, clamping, and fastening methods, plus fundamentals of machining fixture design and CNC applications. The curriculum also covers plant installation objectives, factory layout design principles, investment strategies, Lean manufacturing characteristics, and the design of machining, welding, stamping, and assembly plants.

21. Programme of practices

During the practical sessions, students work on tasks related to technological process planning and fixture design, including consultations. These activities are complemented by knowledge related to plant installation.

22. Programme of laboratories

During the laboratory sessions, we demonstrate tool inspection and the measurement, testing, and implementation activities related to manufacturing processes.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Knowledge of manufacturing repair processes.
2. Knowledge of cutting tools and their geometry.
3. Knows the processes and properties of the machine tool installation in different cases.
4. Knows the technology of equipment design.

b) skills (k)

1. Is able to participate in solving problems in the field of component manufacturing and installation, using the relevant professional knowledge and applying the relevant skills, with knowledge of manufacturing and repair processes, cutting tools, installation processes and equipment design technology, is able to design the manufacturing process of a component, tooling variations, design a device, participate in the design of a plant installation.

c) attitude (a)

1. Cooperates with instructors in their studies to develop knowledge of manufacturing systems.

d) autonomy and responsibility (o)

1. Is aware of the responsibility to set an example to your colleagues by the quality of your work and by adhering to ethical standards, applying the knowledge acquired in the subject with responsibility.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. mindterm exam 2. homework 1 3. homework 2	1. ZH 2. HF1 3. HF2	1. 20% 2. 15% 3. 15%	1. t1-t4,k1,a1,o1 2. t1-t4,k1,a1,o1 3. t1-t4,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Oral exam	1. Vizsg1	1. 50%	1. t1-t4,k1,a1,o1

26. Criteria to obtain a signature / midterm grade

During the semester 1 midterm test has to be completed with at least 50 % of the maximal points. In the semester participation in labs is mandatory and the planning task is required to be delivered to an acceptable level. The condition of the signature is the correspondingly qualified midterm exam, fulfilment of all lab activities and task submission.

27. Grading rules

0-<50%: fail (1),
50-<62%: pass (2),
62-<75%: satisfactory (3),
75-<87%: good (4),
87-100%: excellent (5).

28. Attendance and participation requirements

According to TVSZ

29. Retake and delayed completion

One midterm test can be retaken twice, homeworks can be supplemented during the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

Auxiliary materials and ppt's downloadable from the Moodle.
Takács J. (ed.); Balla S., Göndöcs B.; Sólyomvári K. Weltsch Z.: Vehicle manufacturing processes II (in Hungarian). Budapest, Typotex; 2012.
Takács J. (ed.); Pál. Z.; Szmejkál A.: Vehicle manufacturing and reparation (in Hungarian); Budapest, Typotex; 2012.
Rábel (szerk.): Pocketbook of machine industry experts (in Hungarian); MK, 1979.
König: Grinding, friction grinding, mirror grinding (in Hungarian), MK, 1983.
Káldos, Nagy, Takács: Chipping and tools I., II. (in Hungarian), Tankönyvkiadó Budapest, 1991.
Grant: Workpiece clamping devices (in Hungarian), MK. Budapest, 1970.
Göndöcs: Deployment (in Hungarian); BME handout, 2008.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle on-board systems 1.**				
2. Subject name in Hungarian	Járműfedélzeti rendszerek 1.			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ4C03-00**			**5. Term | role**	**4 | sp**
6. Credits	**5**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**2 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	**Preparation for lessons**	14 hours	**Homework**	0 hours
Reading written materials	25 hours	**Midterm preparation**	31 hours	**Exam preparation**	24 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Aradi Szilárd associate professor	**15. Email address**	aradi.szilard@kjk.bme.hu
16. …organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Aradi Szilárd, Dr. Bécsi Tamás, Dr. Fehér Árpád		

18. Indicative prerequisites	BMEKOKJBSM2001-00 Elektrotechnika - elektronika recommended core, BMEKOKJBSM1001-00 Programozás recommended core, - - -

19. Purpose

The aim of the course is to provide students with a solid foundation in the C programming language and to introduce them to the basics and practical aspects of microcontroller development. Through both theoretical and practical sessions, students will become familiar with the structure of C programs, essential programming techniques, computer architecture concepts, and the operation of microcontrollers, with a particular focus on the AVR architecture and the ATmega128 microcontroller. The course also aims to equip students with the skills necessary to develop and test simple microcontroller-based applications.

20. Programme of lectures

The lectures cover the fundamentals of the C programming language, including data types, constants, variables, operators, control structures, the C preprocessor, loop control, and functions. The curriculum also includes pointers, string formatting and output, as well as structures, unions, string handling functions, and mathematical operations.

The lectures also cover the history of integrated circuit technology, manufacturing processes, basic concepts of CPUs and memory, and the general architecture of microcontrollers. A detailed introduction to the AVR architecture and the ATmega128 microcontroller includes clock management and the operation of I/O ports. Timer management and different microcontroller architectures are also discussed.

21. Programme of practices

The practical curriculum includes number system conversions, handling fractional numbers, two's complement representation, character encoding methods, and floating-point representation. During the practice of binary operations, BCD and Stibitz addition, as well as binary multiplication and division, are emphasized.

Students learn to use the Visual Studio C development environment, familiarize themselves with program structure, input/output handling, macros, control structures, and functions, which they practice through small exercises.

The application of pointers is reinforced through practical tasks, and the introduction and practice of linked lists are also part of the curriculum. After assessing their knowledge of the C language, students are introduced to microcontroller development, gaining experience with the Microchip Studio environment and development boards. Practical tasks further enhance their understanding of port handling.

The curriculum also covers timer management, task execution, and microcontroller-based C programming structures. Throughout the semester, practical assignments such as measuring the time between two button presses and implementing a simple calculator are included.

22. Programme of laboratories

During the laboratory sessions, students design, build, and test simple circuits that are also used in vehicles and can be interfaced with microcontrollers. The practical work includes documenting and evaluating measurements, as well as gaining in-depth knowledge and experience with diagnostic tools such as oscilloscopes and logic analyzers. The exercises are based on the components available on the BIGAVR6 development board (LEDs, buttons, sensors, etc.), allowing students to gain hands-on experience in a microcontroller-based environment.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understands number representation methods, binary arithmetic, and logical operations.
2. Has a solid foundation in C programming, including data types, control structures, functions, and pointers.
3. Understands the architecture of microcontrollers, including AVR architecture and ATmega128 components.
4. Knows how timers, interrupts, and low-level programming function.
5. Is familiar with microcontroller development environments and programming structures

b) skills (k)

1. Able to design and implement console applications in C language in a PC environment.
2. Able to manage and program the hardware resources of microcontrollers at a basic level.

c) attitude (a)

1. Open to the development of vehicle electronic systems.
2. Interested in hardware-oriented and low-level programming.

d) autonomy and responsibility (o)

1. Able to independently learn new microcontroller architectures and development environments.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 1. 2. midterm test 2.	1. ZH1 2. ZH2	1. 25% 2. 25%	1. t1,t2,k1 2. t4,k2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	0,5	1. t3,t5,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

Both midterm test results shall in at least a grade of 2.

27. Grading rules

0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is allowed for both midterm requirements (2 midterm exams).

30. Consultation

After prior arrangement, meetings are possible at any time during the semester, both in person and online.

31. Learning materials

Lecture slides, electronic course material and exercise book,
Brian W. Kernighan, Dennis M. Ritchie: C Programming Language

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle on-board systems 2.**				
2. Subject name in Hungarian	Járműfedélzeti rendszerek 2.			**3. Programme**	j
4. Subject code	**BMEKOKJBSJ5C01-00**			**5. Term | role**	**5 | sp**
6. Credits	**5**	**7. Evaluation type**	**e**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**2 lecture**	**1 practice**	**2 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	70 hours	**Preparation for lessons**	7 hours	**Homework**	23 hours
Reading written materials	10 hours	**Midterm preparation**	20 hours	**Exam preparation**	20 hours

13. Organisational unit in charge	Department of Control for Transport and Vehicle Systems		
14. Subject coordinator and its position	Dr. Aradi Szilárd associate professor	**15. Email address**	aradi.szilard@kjk.bme.hu
16. …organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Aradi Szilárd, Dr. Bécsi Tamás, Dr. Fehér Árpád		
18. Indicative prerequisites	BMEKOKJBSJ4C03-00 Járműfedélzeti rendszerek 1. recommended core, - - -, - - -		

19. Purpose

The aim of the course is to provide students with comprehensive theoretical and practical knowledge of embedded systems and in-vehicle communication technologies, including their operation, development, and application, supported by individual project work.

20. Programme of lectures

The lectures cover the topics of embedded systems and in-vehicle communication technologies. The curriculum begins with the operation and handling of interrupts, with particular focus on timer-based and button handling solutions. In addition to the use of analog-to-digital conversion and analog comparators, the UART, I2C, and SPI communication interfaces are also introduced.

Within the framework of the course, students acquire comprehensive knowledge of automotive communication networks, with a special emphasis on CAN, FlexRay, and LIN technologies. Through lectures and practical sessions, they learn about the operation, application areas, and implementation possibilities of these systems. In the second half of the semester, independent project assignments replace the lectures, allowing students to apply their acquired theoretical knowledge in practical development tasks. The work is supported by individual and group consultations, ensuring effective problem-solving and the deepening of development skills.

21. Programme of practices

The practical sessions begin with the implementation of interrupts, timer management, button debouncing, and analog-to-digital conversion. After covering the theoretical and practical aspects of LCD programming, students develop their own LCD libraries and practice EEPROM handling.

In the practical application of communication interfaces, the primary focus is on establishing a connection between the microcontroller and the PC, while the implementation of the CAN protocol is deepened through the development of a CAN library and the use of the CANalyzer tool.

Midway through the semester, a test assesses students' knowledge in timer management, A/D conversion, interrupts, and LCD programming. In the subsequent classes, the emphasis shifts to the implementation of group project tasks. Students also acquire GIT version control skills and implement the hardware and software components specific to their assigned projects.

The practical work is supported by consultations, ensuring the successful execution of both individual and group projects. At the end of the semester, students present their completed developments through a presentation that includes a brief description of the task, a demonstration of the functionality, the software structure, and the solutions to the challenges encountered.

22. Programme of laboratories

The aim of the laboratory sessions is to deepen students' microcontroller-related knowledge in the context of embedded systems and in-vehicle communication. Students implement and test interrupt handling, A/D conversion, as well as UART, I2C, SPI, and CAN communication in practice. The sessions are based on the BIGAVR6 development board, and students use oscilloscopes and the CANalyzer tool for measurements and debugging. They prepare measurement reports and learn to effectively use diagnostic tools for examining microcontroller-based systems. In the second half of the semester, the focus shifts to individual and group project work, during which students develop, test, and document their own solutions.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. Understands the operation, peripherals, and programming of microcontrollers.
2. Has knowledge of UART, I2C, SPI, CAN, LIN, and FlexRay communication protocols.
3. Is familiar with the handling of LCD displays, EEPROM memories, and sensors.
4. Acquires knowledge of software modularization.
5. Learns to use version control (GIT) and development environments.

b) skills (k)

1. Is capable of programming microcontrollers and handling peripherals.
2. Is capable of implementing and debugging communication protocols.
3. Is capable of independently and collaboratively completing project-based development tasks.
4. Is capable of presenting the solutions developed during teamwork.

c) attitude (a)

1. Shows interest in embedded systems and automotive technologies.
2. Demonstrates precision and a problem-solving attitude in development tasks.
3. Is open to learning new technologies and development tools.

d) autonomy and responsibility (o)

1. Is capable of independently learning new microcontroller architectures and development environments.
2. Takes responsibility for the operation of the software and systems they develop.
3. Effectively contributes to the development of complex embedded systems in a team environment.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. team project assignment	1. ZH 2. PF	1. 35% 2. 35%	1: t4,k1,k2,o1 2: t5,k3,k4,a2,a3,o2,o3

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	0,3	1. t1-t3,a1

26. Criteria to obtain a signature / midterm grade

To obtain the course signature, the midterm test and the team project assignment must be completed with at least a passing grade (2).

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion is allowed for both the midterm test and the team project assignment.

27. Grading rules

0%-49%: fail; 50%-60%: pass; 61%-70%: satisfactory; 71-80%: good; 81%-100%: excellent

30. Consultation

After prior arrangement, meetings are possible at any time during the semester, both in person and online.

31. Learning materials

Lecture slides, electronic course material and exercise book.

32. Start of validity for the subject decription

September 1st, 2025

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

Subject description

1. Subject name	**Vehicle operation**				
2. Subject name in Hungarian	Gépjárművek üzeme			**3. Programme**	j
4. Subject code	**BMEKOGJBSJ6A03-00**			**5. Term | role**	**6 | sp**
6. Credits	**4**	**7. Evaluation type**	**m**	**8. Nature**	**contact lessons**
9. Weekly contact hours	**1 lecture**	**1 practice**	**1 laboratory**	**10. Language**	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals					
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	**Preparation for lessons**	28 hours	**Homework**	14 hours
Reading written materials	16 hours	**Midterm preparation**	20 hours	**Exam preparation**	0 hours

13. Organisational unit in charge	Department of Automotive Technologies		
14. Subject coordinator and its position	Dr. Harth Péter senior lecturer	**15. Email address**	harth.peter@kjk.bme.hu
16. …organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Virt Márton, Dr. Nyerges Ádám, Dr. Harth Péter, Dr. Szabó Bálint, Tollner Dávid, Dr. Hanula Barna		

18. Indicative prerequisites

- - -,
- - -,
- - -

19. Purpose

The aim of the course is to introduce students to the systematic diagnosis and operation of vehicles.

20. Programme of lectures

Overview of the main systems and other subsystems of a vehicle for system diagnostics and system-level understanding.

21. Programme of practices

Specific diagnostics of vehicle systems (braking system, shock absorbers, lighting, etc.).

22. Programme of laboratories

Supporting practice activities in laboratory environment.

23. Learning outcomes (lower case) and their link to the traning programme's learning outcomes (upper case)

The student

a) knowledge (t)

1. knows the motor vehicle systems on system-level

b) skills (k)

1. is able to understand the operation of the systems that make up the vehicle, and is able to independently troubleshoot and perform diagnostics.

c) attitude (a)

1. seeks to find the relationships between the different subject areas.
2. strives to interpret the content (lectures, statements, diagrams) of the lectures and exercises independently, and is open to thinking with the lecturer and other students.
3. strives for active participation in lectures and exercises.

d) autonomy and responsibility (o)

1. accepts the framework for the completion of the subject matter and carries out its tasks independently and responsibly within the framework of ethical standards.
2. responsibly applies the knowledge gained in the subject subject to its limitations.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test	1. ZH	1. 50%	1. t1,k1,a1,o1,o2
2. Homework	2. HF	2. 50%	2. t1,k1,a2,a3,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
-	-	-	-

26. Criteria to obtain a signature / midterm grade	27. Grading rules
Passing the midterm test with at least a pass grade, accepted homework.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to TVSZ	
29. Retake and delayed completion	
Combined verbal replacement of the midterm test and the homework is possible.	

30. Consultation
Every lecture
31. Learning materials
Lakatos, I., Nagyszokolyai, I.: Vehicle operation I. (in Hungarian)
32. Start of validity for the subject decription
September 1st, 2025