MŰEGYETEM 1782

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

Vehicle Engineering Master Programme
Recommended curriculum and subject descriptions

Valid from September 2025

Code:
6NAMJR_SH_2025

Recommended curriculum of the Vehicle Engineering Master Programme

Start in February:

1./spring	Advanced mathematics	BMETEMIMSKHMAT-00	2	1	0	m	5	PK	TTK
1./spring	Project management	BMEKOGJMSJ1001-00	2	2	0	m	5	PK	GJT
1./spring	Technical modeling and simulations	BMEKOVJMSJ1001-00	1	1	1	e	5	PK	VJJT
1./spring	Electrics and electronics M	BMEKOKJMSJ1001-00	2	1	0	e	5	PK	KJIT
1./spring	Spec 1		2	0	2	e	5	SP	
1./spring	Spec 2		2	0	2	m	5	SP	
2./autumn	Advanced materials and production technologies	BMEKOGJMSJ2001-00	1	2	0	e	5	PK	GJT
2./autumn	Major compulsory elective course	BMEKO%	1	1	0	m	3	MA	
2./autumn	Engineering calculations	BMEKORHMSJ2001-00	0	1	1	m	3	PK	RHT
2./autumn	System integration	BMEKOKJMSJ2001-00	1	1	1	e	4	PK	KJIT
2./autumn	Computational fluid dynamics	BMEKORHMSJ2002-00	1	2	1	e	5	PK	RHT
2./autumn	Spec 3		2	0	2	m	5	SP	
2./autumn	Spec 4		2	0	2	e	5	SP	
3./spring	Measurement methods	BMEKOVJMSJ3001-00	1	1	2	m	5	PK	VJJT
3./spring	Elective course 1.	BME%	2	0	0	m	3	EC	
3./spring	Compulsory elective economics and human science 1.	BMEGT%	2	0	0	m	3	CE	GTK
3./spring	Spec 5		1	0	2	m	4	SP	
3./spring	Spec 6		1	0	2	m	4	SP	
3./spring	Master thesis 1.	BMEKO__MSM3551-00	0	6	0	m	12	IP	
3./spring	Traineeship	BMEKO__MSM4501-00	4weeks	0	0	s	0	CR	
4./autumn	Quality, safety and homologation	BMEKORHMSJ4001-00	2	1	0	m	5	PK	GJT KJIT RHT
4./autumn	Elective course 2.	BME%	2	0	0	m	3	EC	
4./autumn	Compulsory elective economics and human science 2.	BMEGT%	2	0	0	m	3	CE	GTK
4./autumn	Master thesis 2.	BMEKO__MSM4551-00	0	10	0	m	18	IP	

Start in September:

1./autumn	Advanced materials and production technologies	BMEKOGJMSJ2001-00	1	2	0	e	5	PK	GJT
1./autumn	Major compulsory elective course		1	1	0	m	3	MA	
1./autumn	Engineering calculations	BMEKORHMSJ2001-00	0	1	1	m	3	PK	RHT
1./autumn	System integration	BMEKOKJMSJ2001-00	1	1	1	e	4	PK	KJIT
1./autumn	Computational fluid dynamics	BMEKORHMSJ2002-00	1	2	1	e	5	PK	RHT
1./autumn	Elective course 1.	BME%	2	0	0	m	3	EC	
1./autumn	Compulsory elective economics and human science 1.	BMEGT%	2	0	0	m	3	CE	GTK
1./autumn	Compulsory elective economics and human science 2.	BMEGT%	2	0	0	m	3	CE	GTK
2./spring	Advanced mathematics	BMETEMIMSKHMAT-00	2	1	0	m	5	PK	TTK
2./spring	Project management	BMEKOGJMSJ1001-00	2	2	0	m	5	PK	GJT
2./spring	Technical modeling and simulations	BMEKOVJMSJ1001-00	1	1	1	e	5	PK	VJJT
2./spring	Electrics and electronics M	BMEKOKJMSJ1001-00	2	1	0	e	5	PK	KJIT
2./spring	Spec 1		2	0	2	e	5	SP	
2./spring	Spec 2		2	0	2	m	5	SP	
2./spring	Traineeship	BMEKO__MSM4501-00	4weeks	0	0	s	0	CR	
3./autumn	Quality, safety and homologation	BMEKORHMSJ4001-00	2	1	0	m	5	PK	GJT KJIT RHT
3./autumn	Elective course 2.	BME%	2	0	0	m	3	EC	
3./autumn	Spec 3		2	0	2	m	5	SP	
3./autumn	Spec 4		2	0	2	e	5	SP	
3./autumn	Master thesis 1.		0	6	0	m	12	IP	
4./spring	Measurement methods	BMEKOVJMSJ3001-00	1	1	2	m	5	PK	VJJT
4./spring	Spec 5		1	0	2	m	4	SP	
4./spring	Spec 6		1	0	2	m	4	SP	
4./spring	Master thesis 2.	BMEKO__MSM4551-00	0	10	0	m	18	IP	

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

Aerospace vehicle engineer specialisation

Advanced flight theory	BMEKORHMSJ1D01-00	2	0	2	e	5	SP	RHT
Aircraft design and production 1.	BMEKORHMSJ1D02-00	2	0	2	m	5	SP	RHT
Aircraft design and production 2.	BMEKORHMSJ2D01-00	2	0	2	m	5	SP	RHT
Analysis of aircrafts 1.	BMEKORHMSJ2D02-00	2	0	2	e	5	SP	RHT
Analysis of aircrafts 2.	BMEKORHMSJ3D01-00	1	0	2	m	4	SP	RHT
Aerospace vehicle engineer research project	BMEKORHMSJ3D02-00	1	0	2	m	4	SP	RHT

Automotive vehicle engineer specialisation

Project plan (automotive)	BMEKOGJMSJ1B01-00	2	0	2	e	5	SP	GJT
Requirement definition and collect design **requirements (automotive)**	BMEKOGJMSJ1B02-00	2	0	2	m	5	SP	GJT
Design and model preparation (automotive)	BMEKOGJMSJ2B01-00	2	0	2	m	5	SP	GJT
Simulation and verification (automotive)	BMEKOGJMSJ2B02-00	2	0	2	e	5	SP	GJT
Build and integrate (automotive)	BMEKOGJMSJ3B01-00	1	0	2	m	4	SP	GJT
Testing and validation (automotive)	BMEKOGJMSJ3B02-00	1	0	2	m	4	SP	GJT

Naval vehicle engineer specialisation

Ship theory and propulsion	BMEKORHMSJ1C01-00	1	0	2	m	4	SP	RHT
Ship motions	BMEKORHMSJ1C02-00	3	1	1	e	6	SP	RHT
Ship design	BMEKORHMSJ2C01-00	2	1	1	m	6	SP	RHT
Ship stregth	BMEKORHMSJ2C02-00	2	1	1	e	4	SP	RHT
Design of pleasure crafts	BMEKORHMSJ3C01-00	1	1	2	m	5	SP	RHT
Ship hydrodynamics calculations	BMEKORHMSJ3C02-00	1	0	1	m	3	SP	RHT

Railway vehicle engineer specialisation

Traction unit systems	BMEKOVJMSJ1A01-00	3	1	0	e	5	SP	VJJT
Railway vehicle design 1.	BMEKOVJMSJ1A02-00	1	0	3	m	5	SP	VJJT
Railway vehicle design 2.	BMEKOVJMSJ2A01-00	1	0	3	m	5	SP	VJJT
Railway vehicle system dynamics	BMEKOVJMSJ2A02-00	3	1	0	e	5	SP	VJJT
Railway vehicle measurement techniques and	BMEKOVJMSJ3A01-00	1	0	2	m	4	SP	VJJT
Traction mechanics and energetics	BMEKOVJMSJ3A02-00	1	2	0	m	4	SP	VJJT

Vehicle manufacturing and repairing engineer specialisation

Vehicle manufacturing technology project	BMEKOGJMSJ1G01-00	2	0	2	m	5	SP	GJT
Surface engineering	BMEKOGJMSJ1G02-00	2	0	2	e	5	SP	GJT
Design of vehicle manufacturing systems 1.	BMEKOGJMSJ2G01-00	2	0	2	m	5	SP	GJT
Fixing and sealing technologies	BMEKOGJMSJ2G02-00	2	0	2	e	5	SP	GJT
Design of vehicle manufacturing systems 2.	BMEKOGJMSJ3G01-00	1	0	2	m	4	SP	GJT
Measurement systems in vehicle manufacturing	BMEKOGJMSJ3G02-00	1	0	2	m	4	SP	GJT

Lifetime planning engineer specialisation

Statistical basics of lifetime planning	BMEKOVJMSJ1E01-00	2	2	0	e	5	SP	VJJT
Basics of finite element method	BMEKOVJMSJ1E02-00	2	2	0	m	5	SP	VJJT
Analythical methods of lifetime planning	BMEKOVJMSJ2E01-00	2	2	0	m	5	SP	VJJT
Numerical methods of lifetime planning	BMEKOVJMSJ2E02-00	2	2	0	e	5	SP	VJJT
Design theory	BMEKOVJMSJ3E01-00	1	2	0	m	4	SP	VJJT
Measurement methods and data processing	BMEKOVJMSJ3E02-00	1	2	0	m	4	SP	VJJT

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 Master 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 the general conditions of registering for the specialisation subjects:*

There are no general rules for the selection of specialisation and for registering for the specialisation subjects.

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

The prerequisite for enrollment in the Master thesis I. course is the collection of a minimum of 55 credits.

The prerequisite for enrollment in the Master thesis II. course are the collection of a minimum of 84 credits and the completion of the four-week traineeship. The Master thesis I. course can be enrolled simultaneously as coherent requisite, in which case the above cumulative acquired credits must be achieved by completing another subjects according to the recommended curriculum.

4) *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.

5) *Compulsory elective courses, recommended elective courses*

As part of the training programme, students must complete one (= 3 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 6 credits in total elective subjects. The Faculty offers at least eight 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.

6) *Criteria for taking the final examination:*

Completion of all subjects included in the recommended curriculum, including elective subjects (all together at least 120 credits), submitting the Master thesis, and fulfillment of all criterion requirements in the curriculum (four weeks of traineeship).

7) *Final examination order:*

The final examination in front of the Final Examination Board consists of defending the Master 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	**Advanced flight theory**				
2. Subject name in Hungarian	Fejlett repüléselmélet			3. Programme	J
4. Subject code	**BMEKORHMSJ1D01-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
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	25 hours	Midterm preparation	0 hours	Exam preparation	20 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)	Jankovics István				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The objective of this course is to familiarize students not only with the fundamentals of aerodynamics and flight mechanics, but also with the theoretical and practical methods used in the analysis of aircraft aerodynamic characteristics, performance, and static stability.

20. Programme of lectures

Aerodynamics Summary: Generation of lift; drag and its components; airfoil characteristics and aerodynamic profiling; finite wing theory; aerodynamics of cylindrical bodies; high-speed aerodynamics; supersonic flight; aerodynamic characterization of aircraft.

Flight Mechanics Summary: Overview of propulsion systems; aircraft performance parameters; load, speed, and altitude performance curves; finite wing theory; modeling methods; unsteady aerodynamics.

Static Stability and Control: Concept of static stability and controllability; aircraft pitching moment; control-fixed and control-free stability cases; aircraft lateral static stability; aircraft trimming; center of gravity shift; design requirements for tail surfaces.

Special-Purpose Aerial Vehicles: Overview of the aerodynamic and stability considerations specific to unconventional or mission-specific aircraft types.

21. Programme of practices

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22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the aircraft aerodynamics and propulsion.
2. Knows the aerodynamic factors.
3. Knows the fundamentals and calculation methods of aircraft static stability.

b) skills (k)

1. Is able to performe aerodynamic, performance and stability calculations.
2. Is able to support the research and development processes.

c) attitude (a)

1. Is interested, responsive in the chosen expert field.

d) autonomy and responsibility (o)

1. is proactive in the solution of professional tasks, the self-standing selection of the solution methods.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF	1. 50%	1. t1-t3,k1,k2,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

successful completion of the homework

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 for the midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, literature (in english)

32. Start of validity for the subject decription

September 1st, 2025

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Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Advanced materials and production technologies**				
2. Subject name in Hungarian	Korszerű anyagok és gyártástechnológiák			3. Programme	J
4. Subject code	**BMEKOGJMSJ2001-00**			5. Term | role	**2/1 | k**
6. Credits	**5**	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	4 QUALITY EDUCATION; 7 AFFORDABLE AND CLEAN ENERGY; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION; 13 CLIMATE ACTION				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	24 hours
Reading written materials	36 hours	Midterm preparation	14 hours	Exam preparation	26 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. Markovits Tamás, Dr. Vehovszky Balázs, Bereczki Alexandra		

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

19. Purpose

The course aims to provide comprehensive and deeper knowledge in the field of state-of-the-art structural materials and material technologies to students, which can be applied in their design practice.

20. Programme of lectures

The course provides a deeper knowledge of non iron-based structural materials applied in vehicle industry. Modern light metal alloys, elastomers, plastics, composites and ceramics are described. The physical properties, production technologies and peculiarities of manufacturing are described in details of the mentioned structural materials of vehicles.

During the course the students are introduced into the basic knowledge necessary for each topic, mentioned above, such as thermodynamic stability, metastability, non-equilibrium systems, the effect of phase relations on material properties, strength enhancement, and material interactions.

The characteristics of composites and hybrid materials and their production technologies are presented. Students are introduced to the technological bases of surface modification phenomena and technologies as well as additive manufacturing.

Within the scope of the course we discuss the aspects of material selection in the consideration of operating conditions of the vehicles and environmental protection.

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.), and solving practical tasks in the topics such as equilibrium transformations, quality certificates, selection of semi-finished products based on specified criteria from metallic and non-metallic raw materials as well as to provide a material model for a real material based on material testing.

22. Programme of laboratories

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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 what is the role of it 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. (T3)
4. Knows the mechanisms of strength enhancement. (T4)
5. Knows the classification of light metals based on microstructure characteristics.
6. Knows the purpose of the manufacturer's quality certificate and the most important contents of it.
7. Knows the most important properties of sheet products in the point of view of technology. (T4)
8. Knows the phase conditions are formed in metal-gas systems.

9. Knows the concept of surface modification, its main goals, and the most important procedures. (T3)
10. Knows the advantages and disadvantages of using ceramic materials, the major physical properties of ceramics, and the most important aspects of ceramic design. (T4)
11. Knows the most important steps in the manufacturing of modern technical ceramics.
12. Knows the types of composite materials, their structural features and their effect on physical properties. (T4)
13. Knows the types of plastics and elastomers, their structural features and their impact on physical properties. (T4)
14. Knows the types of material models.
15. Knows the main types of additive manufacturing processes. (T4)

b) skills (k)

1. Able to see and explain the relationship between the phase diagram and the physical properties of binary systems.
2. Able to see and explain how the types of metastability are related to the possibilities of strength enhancement.
3. Able to see and explain the relationship between the strength-enhancing mechanisms and the equilibrium phase conditions (shape of the diagrams).
4. Capable of interpreting any manufacturer's quality certificate. (K2)
5. Able to select a sheet material based on the deformations given by a sheet forming technology.
6. Able to propose a surface modification method to achieve a surface property, analyze its feasibility, advantages and limitations. (K6)
7. Able to determine a flexible-plastic model by using the results of a tensile test. (K2)
8. Able to collect literature on a specific topic and compile a summary based on it. (K2,K6)

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. Apply responsibly the knowledge acquired during the course with regard to their validity limits.
3. The task is performed 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. Student assignment	1. ZH 2. HF	1. 0% 2. 50%	1. t1-t11,k1-k6 2. a1-a3,o1-o3

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. IRV	1. 50%	1. t1-t15,k1-k8

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 students have to pass a midterm exam with a result of 50% of the maximum points. The conditions for obtaining the signature are completing the midterm test and completing the assignment.

27. Grading rules

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

28. Attendance and participation requirements

According to CoS.

29. Retake and delayed completion

The midterm exam 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 mid-term assessment or for consultation of student assignments based on individual appointment arrangements.

31. Learning materials

Charles Kittel: Introduction to solid state physics,
Thornton, Calangelo: Fundamentals of engineering materials, Prentice-Hall, Inc. New Jersey, 1985,
Flinn, Trojan: Engineering Materials and Their Applications,
Auxiliary materials and ppt's downloadable from the Moodle system.

32. Start of validity for the subject decription

September 1st, 2025

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Faculty of Transportation Engineering and Vehicle Engineering

Subject description

1. Subject name	**Advanced mathematics**						
2. Subject name in Hungarian	Haladó matematika				3. Programme	J	
4. Subject code	**BMETEMIMSKHMAT-00**				5. Term | role	**1/2 | k**	
6. Credits	**5**	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	4 QUALITY EDUCATION						
12. Working hours for fulfilling the requirements of the subject						**150 hours**	
Contact hours	42 hours	Preparation for lessons	14 hours		Homework	0 hours	
Reading written materials	24 hours	Midterm preparation	40 hours		Exam preparation	30 hours	
13. Organisational unit in charge	Department of Analysis and Operations Research (TTK)						
14. Subject coordinator and its position			15. Email address				
16. …organisational unit	Department of Analysis and Operations Research (TTK)						
17. Instructor(s)							
18. Indicative prerequisites	- - -, - - -, - - -						

19. Purpose

The aim of the is understanding and applying numerical methods and their computational implementations in engineering practice.

20. Programme of lectures

Numerical solutions of system of linear algebraic equations. Norms, condition number. Numerical solutions of initial value problems. Runge-Kutta-methods.

21. Programme of practices

Numerical solutions of system of linear algebraic equations. Norms, condition number. Numerical solutions of initial value problems. Runge-Kutta-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. Understands and applies the general and specific mathematical, natural and social science principles, rules, contexts and procedures relevant to the profession of automotive engineer, as well as to the technical field of engineering (T1,T4,T11)

b) skills (k)

1. Is able to apply the acquired general and specific mathematical, natural and social science principles, rules, contexts and procedures in solving problems in the field of engineering (K1,K3)

c) attitude (a)

1. Strives for broad, comprehensive literacy (A8)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods (O1)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. 1. Zh 2. 2. Zh	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
-	-	-	-

<table>
<tr><th>26. Criteria to obtain a signature / midterm grade</th><th>27. Grading rules</th></tr>
<tr><td>successful (min. 50%) completion of both midterm tests</td><td rowspan="5">Excellent 85-100%
Good 70-84%
Satisfactory 55-69%
Pass 40-54%
Fail 0-39%</td></tr>
<tr><th>28. Attendance and participation requirements</th></tr>
<tr><td>according to the rules of CoS</td></tr>
<tr><th>29. Retake and delayed completion</th></tr>
<tr><td>midterm tests' retakes can be repeated</td></tr>
<tr><th colspan="2">30. Consultation</th></tr>
<tr><td colspan="2">at a time and in a form agreed with the teacher</td></tr>
<tr><th colspan="2">31. Learning materials</th></tr>
<tr><td colspan="2">slides</td></tr>
<tr><th colspan="2">32. Start of validity for the subject decription</th></tr>
<tr><td colspan="2">September 1st, 2025</td></tr>
</table>

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

Subject description

1. Subject name	**Aerospace vehicle engineer research project**				
2. Subject name in Hungarian	Repülőmérnöki kutatási projekt			3. Programme	J
4. Subject code	**BMEKORHMSJ3D02-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	14 hours	Homework	20 hours
Reading written materials	24 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. 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, Gál István, Dr. Rohács József, Jankovics István, Faltin Zsolt, Dr. Veress Árpád				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Participation in a research project

20. Programme of lectures

Introduction to the preparation of research tasks, presentation of the selected research task

21. Programme of practices

-

22. Programme of laboratories

Completion of sub-tasks of a research or design project currently in progress at the department or with industrial partners, preparation of reports, publications, and consultation of the process with the faculty

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 theoretical and practical foundations of aerospace vehicle engineering field
2. understand the sources and methods of further learning in the research area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the aerospace vehicle engineering project and use the necessary IT tools
2. is able to use the knowledge acquired in the research field

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. oral report	1. HF 2. SZB	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,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 completion of the homework and the oral 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 for the midterm requirements.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Scientific 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 production 1.**				
2. Subject name in Hungarian	Repülőgépek tervezése és gyártása 1.			3. Programme	J
4. Subject code	**BMEKORHMSJ1D02-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	14 hours	Homework	55 hours
Reading written materials	25 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)	Jankovics István, Veress Árpád				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to learn the steps and skills required to design aircraft and their engines, start of design.

20. Programme of lectures

Steps in the aircraft design process. Concept level design. Specification of target requirements for the aircraft. Specification of aircraft shape. Engine selection. Specification of the aeroplane's mission. Methods of determining masses, e.g. on a statistical basis. The fuel ratio method. Determination of take-off mass by iteration. Estimation of aerodynamic characteristics. Task of the structural elements and systems of the aeroplane. Determination of loads, power requirements. Pre-planning based on loads, determination of main dimensions. Analysis of theoretical and practical aspects of engine development. Jet engine design: concentrated parameter calculation, determination of main dimensions of the engine, meanline design, blade twisting laws and blade twist calculation, 3D component design and CAD model building.

21. Programme of practices

-

22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the theoretical and practical foundations of aircraft design and production
2. understand the sources and methods of further learning in the aircraft design and production area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the aircraft design and production and use the necessary IT tools
2. is able to use the knowledge acquired in the aircract industry

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes

1. homework 1 2. homework 2	1. HF1 2. HF2	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,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 completion of the two homeworks

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 for both midterm requirements.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, 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 production 2.**				
2. Subject name in Hungarian	Repülőgépek tervezése és gyártása 2.			3. Programme	J
4. Subject code	**BMEKORHMSJ2D01-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	14 hours	Homework	55 hours
Reading written materials	25 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)	Jankovics István, Veress Árpád				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The course aims at designing aircraft and their engines and start of their analysis

20. Programme of lectures

Calculation of air forces acting on the wing, control surface. Strength calculations of hemispherical elements. Calculation of buckling stresses in plate cover and effect of buckling on the structure as a whole. Influence of design methods on the realised structure. Design solutions for aircraft structural elements. Aerospace fasteners. Basic composite calculation skills. Airframe materials, manufacturing technologies and designs. Virtual prototyping and verification of engine components designed and modelled with CAD software in the framework of the subject Aircraft Design and Manufacturing I: CFD simulation of compressor or turbine stage, static strength analysis of disc and blades, calculation of natural frequency and random excitation stresses, and if interested, CFD simulation of combustion chamber, thermal calculations (nacelle insulation, blade cooling, secondary flows, etc.), thermal simulation of the engine components, and the design of the engine components) and fatigue calculations
(blade, disc and drums)

21. Programme of practices

-

22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the theoretical and practical foundations of aircraft design and production
2. understand the sources and methods of further learning in the aircraft design and production area
b) skills (k)
1. is able to summarise and illustrate the activities carried out in the aircraft design and production and use the necessary IT tools
2. is able to use the knowledge acquired in the aircract industry
c) attitude (a)
1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines
d) autonomy and responsibility (o)
1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 1 2. homework 2	1. HF1 2. HF2	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,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 completion of the two homeworks

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 for both midterm requirements.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, 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	**Analysis of aircrafts 1.**				
2. Subject name in Hungarian	Repülőgépek vizsgálata 1.			3. Programme	J
4. Subject code	**BMEKORHMSJ2D02-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
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	25 hours	Midterm preparation	0 hours	Exam preparation	20 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)	Jankovics István, Veress Árpád		

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

19. Purpose

The aim of the course is to learn the further skills required to analyse aircraft

20. Programme of lectures

Coordinate systems. Orientation and rotation. Transformation matrices. Euler angles, quaternions, Rodrigez description. Equation of momentum, equation of perdition, Euler equation.

Description of aircraft motion, equation of motion of aircraft. Linearization of equation of motion Small perturbations method, separation. State space description method. Full and compact derivatives. Calculating the derivatives of length and lateral motion of air force. Calculation of length and lateral displacement derivatives of rudder. Multibody models. Simulators, flight control.

21. Programme of practices

-

22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the theoretical and practical foundations for analysis of aircrafts
2. understand the sources and methods of further learning in the analysis of aircrafts area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the analysis of aircrafts and use the necessary IT tools
2. is able to use the knowledge acquired in the aircract industry

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF	1. 50%	1. t1,t2,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,t2,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

successful completion of the homework

28. Attendance and participation requirements

according to the rules of CoS

29. Retake and delayed completion

Second retake or delayed completion for the midterm requirement.

27. Grading rules

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

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Lecture slides, 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	**Analysis of aircrafts 2.**				
2. Subject name in Hungarian	Repülőgépek vizsgálata 2.			3. Programme	J
4. Subject code	**BMEKORHMSJ3D01-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	14 hours	Homework	19 hours
Reading written materials	25 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. Rohács Dániel associate professor		15. Email address	rohacs.daniel@kjk.bme.hu	
16. …organisational unit	Department of Aeronautics and Naval Architecture				
17. Instructor(s)	Jankovics István, Veress Árpád				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The course aims to analyse aircraft

20. Programme of lectures

Measurement methods, instruments, instrument calibration procedures, flight test design, implementation and evaluation methods.

21. Programme of practices

-

22. Programme of laboratories

Test design, evaluation of results

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 theoretical and practical foundations for analysis of aircrafts
2. understand the sources and methods of further learning in the analysis of aircrafts area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the analysis of aircrafts and use the necessary IT tools
2. is able to use the knowledge acquired in the aircract industry

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. midterm test	1. HF 2. ZH	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,k1,k2,a1,a2,o1,o2

25. Exams

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

<table>
<tr><th>26. Criteria to obtain a signature / midterm grade</th><th>27. Grading rules</th></tr>
<tr><td>successful completion of the homework and the midterm test</td><td rowspan="5">Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%</td></tr>
<tr><th>28. Attendance and participation requirements</th></tr>
<tr><td>according to the rules of CoS</td></tr>
<tr><th>29. Retake and delayed completion</th></tr>
<tr><td>Second retake or delayed completion for the midterm requirements.</td></tr>
<tr><th colspan="2">30. Consultation</th></tr>
<tr><td colspan="2">at a time and in a form agreed with the teacher</td></tr>
<tr><th colspan="2">31. Learning materials</th></tr>
<tr><td colspan="2">Lecture slides, literature (in english)</td></tr>
<tr><th colspan="2">32. Start of validity for the subject decription</th></tr>
<tr><td colspan="2">September 1st, 2025</td></tr>
</table>

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

Subject description

1. Subject name	**Analythical methods of lifetime planning**				
2. Subject name in Hungarian	Élettartamra méretezés analitikus módszerei			3. Programme	J
4. Subject code	**BMEKOVJMSJ2E01-00**			5. Term | role	**2/1 | sp**
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. Béda Péter, Devecz János		

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

19. Purpose

Learning the analytical methods needed for lifetime computation

20. Programme of lectures

High-cycle fatigue. Basics of Wöhler curve. Smith and Haigh diagram application. Fatigue under complex load.

Design for reliability above 90%.

Low cycle fatigue. Lifetime computation based on local elongation.

21. Programme of practices

Team project using software from the current lecture topics: fatigue model analysis. Computation results of different softwares. Examples, project 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. Knows and understands the analytical methods of lifetime design.
2. Knows and understands the tools and methods of computer modelling and simulation related to vehicle and mobile machines. (T10)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to solve problems with analytical tools in the domain of lifetime design.
2. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machinery. (K6)
3. Able to contribute original ideas to the knowledge base of the field. (K7)
4. Able to apply and develop procedures, models and information technologies used in the design, implementation and operation of vehicle and mobile machinery systems. (K10)
5. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. homework 3. midterm test 4. midterm test	1. HF1 2. HF2 3. ZH1 4. ZH2	1. 25% 2. 25% 3. 25% 4. 25%	1. t1, t2, t3, k1, k2, k3, k4, a1, o1 2. t1, t2, t3, k1, k2, k3, k4, a1, o1 3. t1, t2, t3, k1, k2, k3, k4, a1, o1 4. t1, t2, t3, k1, k2, k3, k4, a1, o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

The midterm tests and the 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 grade:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homework and 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

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, 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	**Basics of finite element method**				
2. Subject name in Hungarian	Végeselem módszer alapjai			3. Programme	J
4. Subject code	**BMEKOVJMSJ1E02-00**			5. Term │ role	**1/2 │ sp**
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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
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. Béda Péter, Devecz János				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Learning the practical basics of the finite element method

20. Programme of lectures

Basics of Mechanics. Material properties for tough and brittle materials. Polymer material properties. Equivalent stress and its application. Plasticity criteria.

Static finite element model structure. Time dependent model types, contact model.

Optimization process structure, types, algorithm.

21. Programme of practices

Team project using software from the current lecture topics: finite element model analysis. Examples, project 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. Knows and understands the practical application of the finite elements method.
2. Knows and understands the methodology and tools for the design and research of vehicles and mobile machines. (T8)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to solve problems using the finite elements method.
2. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machinery. (K6)
3. Able to contribute original ideas to the knowledge base of the field. (K7)
4. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)
2. Adopts professional and ethical values related to the technical field. (A2)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 2. homework 3. midterm test 4. midterm test	1. HF1 2. HF2 3. ZH1 4. ZH2	1. 25% 2. 25% 3. 25% 4. 25%	1. t1, t2, t3, k1, k2, k3, a1, a2, o1 2. t1, t2, t3, k1, k2, k3, a1, a2, o1 3. t1, t2,t3, k1, k2, k3, a1, a2, o1 4. t1, t2,t3, k1, k2, k3, a1, a2, o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

The midterm tests and the 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 grade:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homework and 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

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, 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	**Build and integrate (automotive)**				
2. Subject name in Hungarian	Megvalósítás és integráció (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ3B01-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES; 13 CLIMATE ACTION				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	28 hours	Homework	30 hours
Reading written materials	0 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. Nyerges Ádám senior lecturer	15. Email address	nyerges.adam@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	Szimuláció és ellenőrzés (autómérnök) recommended core, - - -, - - -

19. Purpose

The aim of the course is to familiarize the student with the final phase of development processes occurring in automotive engineering practice, implementation, testing and verification.

20. Programme of lectures

Structural design, control design, software design, electronics design, product testing.

21. Programme of practices

-

22. Programme of laboratories

Engine and vehicle dyno measurements, suspension systems, brake system measurements.

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

The student

a) knowledge (t)

1. gets the knowledge to realize, produce and test the product.

b) skills (k)

1. performs independent and self-critic engineering work, create solution options, and propose and design optimal solutions.

c) attitude (a)

1. takes into account design requirements: standards, regulations/legislation, accepts design conditions and works in accordance with and adheres to them.

d) autonomy and responsibility (o)

1. is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project 2. Oral report	1. TF 2. SZB	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	27. Grading rules

<table>
<tr><td>Accepted semester design project and oral report.</td><td rowspan="5">Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%</td></tr>
<tr><td>28. Attendance and participation requirements</td></tr>
<tr><td>According to CoS.</td></tr>
<tr><td>29. Retake and delayed completion</td></tr>
<tr><td>Re-submitting a semester design project and retake of oral report during the delayed completion week.</td></tr>
<tr><td colspan="2">30. Consultation</td></tr>
<tr><td colspan="2">Every week.</td></tr>
<tr><td colspan="2">31. Learning materials</td></tr>
<tr><td colspan="2">Lecture notes.</td></tr>
<tr><td colspan="2">32. Start of validity for the subject decription</td></tr>
<tr><td colspan="2">September 1st, 2025</td></tr>
</table>

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

Subject description

1. Subject name	**Computational fluid dynamics**				
2. Subject name in Hungarian	Számítógépes áramlásmodellezés			3. Programme	J
4. Subject code	**BMEKORHMSJ2002-00**			5. Term | role	**2/1 | k**
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	35 hours
Reading written materials	25 hours	Midterm preparation	0 hours	Exam preparation	20 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, Dr. Veress Árpád				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to introduce students to the theoretical and practical aspects of computational fluid dynamics

20. Programme of lectures

Introduction to CFD via industrial applications, Approaches for modelling and conditions for applications, Flow modelling by means of continuum mechanics, System of Navier-Stokes equations, The subject of the CFD; actuality, advantages and application areas, Turbulence and simulation techniques for handling turbulence (DNS, LES and RANS), Reynolds and Favre averaged system of Navier-Stokes equations, Reynolds stress and Eddy viscosity models, Turbulence modelling, k-omega and SST turbulence modelling, Modelling approaches close to the wall; logarithmic-based Wall function and Near-wall resolving approach, Placement of the first cell at the wall, Turbulence boundary conditions at the inlet, Description and characteristics of the most widespread turbulence models, Introduction to discretisation techniques (Finite Difference, Finite Element and Finite Volume Methods), Finite volume method for solving governing equations, The main steps of a CFD simulation tasks; geometry model preparation and simplification, meshing and mesh metrics, material properties, boundary conditions and their definitions, convergence characteristics, visualisation and presentation of the results in qualitative and in quantitative manner, Completing tutor-guided simulation tasks in ANSYS CFX environment with especial care for heat transfer, compressible and incompressible flow and for supersonic flow.

21. Programme of practices

The students can get experiences in the practical computational steps of the studied CFD methodology by participating in laboratory practices. The following guided simulation tasks are performed during the exercises for example: Flow modelling around a wing profile, CFD analysis of a centrifugal compressor, Numerical flow simulation of particle separation, Free surface flow modelling, CFD analysis of processes developed in combustion chamber, Simulation of turbine stage.

22. Programme of laboratories

The students can get experiences in the practical computational steps of the studied CFD methodology by participating in laboratory practices. The following guided simulation tasks are performed during the exercises for example: Flow modelling around a wing profile, CFD analysis of a centrifugal compressor, Numerical flow simulation of particle separation, Free surface flow modelling, CFD analysis of processes developed in combustion chamber, Simulation of turbine stage.

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 theoretical and practical foundations of the CFD field (T1,T3,T4,T11)
2. understand the sources and methods of further learning in the CFD area (T1,T3,T4,T11)

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the CFD modelling and use the necessary IT tools (K1,K2,K3)
2. is able to use the knowledge acquired in the CFD field (K1,K2,K3)

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF	1. 50%	1. t1,t2,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,t2,k1,k2,a1,a2,o1,o2

26. Criteria to obtain a signature / midterm grade

successful completion of the homwork

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 for the midterm requirement.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

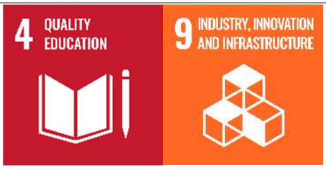
Lecture slides, literature (in english)

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	**Design and model preparation (automotive)**				
2. Subject name in Hungarian	Tervezés és modell előkészítés (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ2B01-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	28 hours	Homework	66 hours
Reading written materials	0 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. 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 familiarize the student with the steps of engineering design, different design strategies, and the application of the engineering approach.

20. Programme of lectures

Introduction to the phases of engineering design. Design methods (e.g.: V method), development of an engineering approach. Modeling: application of 2D and 3D models. Steps of 3D model building; component, sheet metal, part assembly, assembly models.

21. Programme of practices

-

22. Programme of laboratories

Presentation of sample constructions for design tasks and familiarization with students in accordance with design criteria.

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 identifies an engineering problem, makes a proposal (for construction), and demonstrates feasibility with technical design documentation.

b) skills (k)

1. performs independent and self-critic engineering work, create solution options, and propose and design optimal solutions.

c) attitude (a)

1. takes into account design requirements: standards, regulations/legislation, accepts design conditions and works in accordance with and adheres to them.

d) autonomy and responsibility (o)

1. is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project	1. TF	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	27. Grading rules
Attending lectures and submitting semester design project.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
30% of lectures can be missed.	
29. Retake and delayed completion	
Re-submitting a semester design project during the delayed completion week.	

30. Consultation
Every week.
31. Learning materials
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	**Design of pleasure crafts**				
2. Subject name in Hungarian	Kishajó tervezés			3. Programme	J
4. Subject code	**BMEKORHMSJ3C01-00**			5. Term │ role	**3 │ 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	20 hours	Homework	40 hours
Reading written materials	14 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. Simongáti Győző				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to synthesise the knowledge previously acquired in different subjects at BSc level by introducing the process of ship design.

20. Programme of lectures

General arrangement of pleasure craft. Hull form optimisation. Design and specification of sail plan and machinery. Aesthetics. Documentation. Case studies.

21. Programme of practices

Practice of sub-tasks for pleasure craft design.

22. Programme of laboratories

Computer aided design tasks.

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 theoretical and practical process of pleasure boat design,
2. is familiar with the range of input parameters, boundary conditions and approximate calculation methods used for preliminary design.

b) skills (k)

1. is able to determine the main dimensions of a boat for a given scope, prepare the general arrangement and a simplified technical description, draw up a lines plan, prepare task-specific drawings,
2. is able to make maximum use of computer tools (Internet, design software, calculation support applications).

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. homework (preparing a tender design for a sailing or motor craft for a given scope) 2. oral report	1. F1 2. SZB	1. 80% 2. 20%	1. t1-2,k1-2,a1-2,o1-2 2. t1-2

25. Exams

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

26. Criteria to obtain a signature / midterm grade

submission of assignment on time or on lessons, and completion of oral report

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 for the midterm requirements.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

Dr. Simongáti: Kishajók (in Hungarian)
Dr. Simongáti: Kishajók II. (2018)(in Hungarian)
Sailing Yacht design: Theory
Sailing Yacht design: Practice
Larson: Principles of Yacht Design

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	**Design of vehicle manufacturing systems 1.**				
2. Subject name in Hungarian	Járműgyártó rendszerek tervezése 1.			3. Programme	J
4. Subject code	**BMEKOGJMSJ2G01-00**			5. Term │ role	**2/1 │ sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	20 hours	Homework	40 hours
Reading written materials	15 hours	Midterm preparation	19 hours	Exam preparation	0 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		

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

19. Purpose

The aim of the course is to introduce the main knowledge necessary for the design of metal forming and welding technologies used in vehicle manufacturing.

20. Programme of lectures

Design of the process and system elements of typical vehicle parts metal forming technologies, technological sequence, selection of machines and machine systems, operation planning and cost analysis.

Presentation of the system elements and processes of bonding technologies used in vehicle production. In the case of thermal bonding, the knowledge required for technology design and the steps of the design process. In the case of arc welding technology, the steps of the technology design task, the definition of data and the necessary documentation system are presented.

21. Programme of practices

-

22. Programme of laboratories

As part of the laboratory practice, students are given a semester-long assignment related to metal forming technology design and welding technology design through independent work. During regular consultations, students finally prepare the assignment to be submitted.

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 system elements and characteristics of the presented procedures, the process steps and the relationships between them, the process, inputs and outputs necessary for technology design in the presented areas.

b) skills (k)

1. Is able to develop system components and processes of the described procedures and solve emerging technological challenges.

c) attitude (a)

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

d) autonomy and responsibility (o)

1. Can participate responsibly in solving independent tasks.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Student assignment 3. Student assignment	1. ZH 2. HF1 3. HF2	1. 30% 2. 35% 3. 35%	1. t1,k1 2. t1,k1 3. k1,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

During the semester the midterm test has to be completed with more the 50 % of the maximal points. In the semester participation in labs is mandatory and the student assignment is required to be delivered to an acceptable level. The condition of the final grade is the correspondingly qualified midterm test, fulfilment of all lab activities and assignments' 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 CoS.

29. Retake and delayed completion

The midterm test can be retaken once, both homeworks can be resubmitted 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	**Design of vehicle manufacturing systems 2.**				
2. Subject name in Hungarian	Járműgyártó rendszerek tervezése 2.			3. Programme	J
4. Subject code	**BMEKOGJMSJ3G01-00**			5. Term │ role	**3 │ 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	25 hours	Homework	25 hours
Reading written materials	8 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. 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	- - -, - - -, - - -				

19. Purpose

The aim of the course is to enable students to independently solve design problems in the fields of tool design, technology design, equipment design, plant and workplace design in all sub-areas related to vehicle manufacturing.

20. Programme of lectures

Survey of materials of cutting tools and the direction of development. Planning of manufacturing system and system elements for vehicle part-production. In this topic are the followings: planning methods of cutting tools (geometrical planning: chip-space planning, chip disposal planning, cooling solution planning, minimal-greasing), tool production methods: slotmilling, backing off turning, backing off grinding, spark manufacturing. Special tools for hard manufacturing of hybrid materials. Defects: deformations, flash appearence, wearing measurement, renovation of edges, tool sharpening. Tool management systems and economical analyses.

21. Programme of practices

-

22. Programme of laboratories

Studying operating vehicle manufacturing systems. Calibration of 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 different cutting tools and tool systems, tool design methods, tool manufacturing methods, new tool materials, their uses, advantages, disadvantages, design methods of devices, automotive plants and design methods, design methods for modern (Industry 4.0) workplaces, as well as development trends and new requirements.

b) skills (k)

1. Is able to use engineering creativity to select the right design method and to design cutting tools, equipment, new plant and workstations.

c) attitude (a)

1. 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, applies responsibly the knowledge acquired during the course with regard to their validity limits.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Homework 1. 2. Homework 2.	1. HF1 2. HF2	1. 40% 2. 40%	1. t1,k1,a1,o1 2. t1,k1,a1,o1

3. Oral report	3. SZB	3. 20%	3. t1,k1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

Completion of the course is conditional on the completion and submission of homework assignments to the required standard by the deadline, furthemore completing the oral report.

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 CoS.

29. Retake and delayed completion

Homework and oral report can be done up to the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

E-books and materials provided by the Department.
Serope Kalpakjian: Manufacturing Manufacturing Engineering and Technology (2013)

32. Start of validity for the subject decription

September 1st, 2025

1. Subject name	**Design theory**				
2. Subject name in Hungarian	Tervezéselméleti ismeretek			3. Programme	J
4. Subject code	**BMEKOVJMSJ3E01-00**			5. Term │ role	**3 │ 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	26 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. Béda Péter, Devecz János				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Learning the design theory background needed for lifetime computation

20. Programme of lectures

Design based on weakly defined requirements. Theory of the design process from requirements specification to the part drawing level. Basics of fracture mechanics.

21. Programme of practices

Team project using software from the current lecture topics: list of requirements, function structure, main plan. Examples, project 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. Knows and understands the methods of the design theory.
2. Knows a wide range of problem-solving techniques for research or academic work. (T11)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to structure a design process and to participate in any substep of that process.
2. Able to process, organise, analyse and draw conclusions from information collected during the implementation of vehicle and mobile machine systems and processes. (K4)
3. Able to recognise the relationships and mechanisms of action between vehicle and mobile machine systems and their constituent processes, and to evaluate and manage them with a systematic approach.(K5)
4. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machines. (K6)
5. Able to contribute original ideas to the knowledge base of the field. (K7)
6. Able to apply integrated knowledge in the fields of transport, mobile machines, process theory, industrial production processes, electronics and information technology. (K8)
7. Able to perform quality assurance, metrology and process control tasks in vehicle and mobile machine systems. (K11)
8. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)

2. Strives to work in a complex approach based on a systems and process-oriented mindset. (A6).

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

2. Decides carefully, in consultation with other disciplines (in particular legal, economic, energy and environmental), independently and with full responsibility. (O2)

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. 17% 2. 17% 3. 66%	1. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1 2. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1 3. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

The midterm test and the two 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 midterm grade:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homeworks and the 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

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, lecture notes

32. Start of validity for the subject decription

September 1st, 2025

1. Subject name	**Electrics and electronics M**				
2. Subject name in Hungarian	Elektrotechnika és elektronika M			3. Programme	J
4. Subject code	**BMEKOKJMSJ1001-00**			5. Term │ role	**1/2 │ k**
6. Credits	**5**	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					**150 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	0 hours
Reading written materials	52 hours	Midterm preparation	28 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. Szabó Géza associate professor	15. Email address	szabo.geza@kjk.bme.hu
16. ...organisational unit	Department of Control for Transportation and Vehicle Systems		
17. Instructor(s)	Dr. Szabó Géza		

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

19. Purpose

It provides engineering knowledge (and develops BSc knowledge further) about the basic theory of electronics and electronic measurement systems, about modeling them, and about their use in transport systems. Introduces students to the operating principles of the basic elements of electronics and measurement technology, the modeling and analysis methodology of circuitry with active circuit elements. It reviews the methods of measuring various electrical and mechanical quantities and the possibilities of processing the measurement results. It illustrates the possibilities of use through various examples of transport sectors.

20. Programme of lectures

Basics of network analysis, Four Pole Theory; analysis rules for circuit elements and networks. Use of active electronic devices in switching mode, analyzing switched operation. Use of active electronic devices in linear operation; small signal AC models of components and networks and analyzing such networks. The use of operational amplifiers (OpAmps). Frequency dependency, frequency dependent amplifiers. Basics of measurement technology, measurement theory. Measurement of signals and signal parameters. Measurement characteristics of signaling and signal transformation. Measurement characterization of signal sources. Signal analysis tools. Review of measurement errors in measurement systems, failure analysis and measurement accuracy issues. Transmitters and transducers of the measuring system. Measuring circuits. Features and tools for signal processing and data storage. Measurement of basic electrical parameters. Voltage measurement, current measurement. Frequency and time measurement. Measuring instruments and measuring tools, calibration. Time and frequency domain. Measurements in the frequency domain. Possibilities of electronic measurement of mechanical quantities. Application of computerized measurement environments for measurement, data collection tasks; signal processing methods. Practical demonstration and active measurement with a special mechanical tension and strain gauge. Failure analysis of equipment and subsystems containing rotating elements using noise and vibration tests.

21. Programme of practices

Application of the principles presented on 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. understands and can apply the circuit analysis techniques of electronic circuits; has knowledge of measurement and measurement theory related to transport and vehicle engineering. (T1,T3-T5)

b) skills (k)

1. is able to analyze or specify electronic sub-systems (eg. motor control or safety traffic control devices) in the field of transport and vehicle. (A1,A2,A8)

c) attitude (a)

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

d) autonomy and responsibility (o)

1. is aware of and treats the responsibility associated with the task solution during electronic system analysis and specification.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. midterm test	1. ZH1 2. ZH2	1. 25% 2. 25%	1. t1,k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. Vizsga	1. 50%	1. t1,k1,a1,o1

26. Criteria to obtain a signature / midterm grade

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

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

One test can be retried at the end of the semester

30. Consultation

Consultation is possible at a time and in a form agreed with the teacher.

31. Learning materials

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 calculations**				
2. Subject name in Hungarian	Mérnöki számítások			3. Programme	J
4. Subject code	**BMEKORHMSJ2001-00**			5. Term │ role	**2/1 │ k**
6. Credits	**3**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**0 lecture**	**1 practice**	**1 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION				
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 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, Faltin Zsolt				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the subject is to introduce teh students into mathematical methods and approximational calculations that are widely used in engineering practice, and which have become widespread primarily in computer technologies and applications.

20. Programme of lectures

-

21. Programme of practices

Errors and their sources, Solution methods for single variable equations (Bisection-, Newton-Raphson-, Regula-falsi and the Secant-method), Solution methods, for Linear equation systems Jacobi-, Gauss-Seidel method, Banach-theorem, Numerical derivation, Numerical integration, Solution methods for Ordinary and Partial differential equations.

22. Programme of laboratories

Practicing the subject materials discussed by solving examples on computer.

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

The student

a) knowledge (t)

1. learns about the approximational calculation procedures in relation with the vehicle engineering profession and field of expertise. (T10)

b) skills (k)

1. understands/interprets and applies mathematical numerical methods related to his/her field of expertise. (K3,K4,K6)

c) attitude (a)

1. actively participates in discussing the different topics on classes. (A7)

d) autonomy and responsibility (o)

-

24. Midterm assessments

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

25. Exams

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

26. Criteria to obtain a signature / midterm grade | **27. Grading rules**

<table>
<tr><td>pass the final examination with at least 50% of the marks</td><td rowspan="5">0-<50%: failed (1),
50-<62%: satisfactory (2),
62-<75%: fair (3),
75-<87%: good (4),
87-100%: excellent (5).</td></tr>
<tr><td>28. Attendance and participation requirements</td></tr>
<tr><td>According to BME TVSZ and participation in labs is mandatory throughout the semester.</td></tr>
<tr><td>29. Retake and delayed completion</td></tr>
<tr><td>Repeated replacement of the midterm test is available.</td></tr>
<tr><td colspan="2">30. Consultation</td></tr>
<tr><td colspan="2">with the teacher at a previously agreed time and form</td></tr>
<tr><td colspan="2">31. Learning materials</td></tr>
<tr><td colspan="2">Presentation slides.</td></tr>
<tr><td colspan="2">32. Start of validity for the subject decription</td></tr>
<tr><td colspan="2">September 1st, 2025</td></tr>
</table>

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

Subject description

1. Subject name	**Fixing and sealing technologies**				
2. Subject name in Hungarian	Kötés és tömítéstechnológiák			3. Programme	J
4. Subject code	**BMEKOGJMSJ2G02-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	20 hours	Homework	20 hours
Reading written materials	20 hours	Midterm preparation	20 hours	Exam preparation	14 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. Markovits Tamás		

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

19. Purpose

A summary presentation of the bonding technologies used in the automotive industry and the transfer of the knowledge necessary for technology design in the case of the main processes.

20. Programme of lectures

Summary presentation of automotive bonding technologies. Transfer of knowledge necessary for the design of adhesive bonding technology. Description of mechanical bonds and their main characteristics and relationships, which are necessary for the design of the technology. Among thermal bonds, a highlighted area is the presentation of the deeper relationships of laser joining technologies. Brazing and welding of metals (steel, aluminum, copper), formation of metal-polymer hybrid bonds.

21. Programme of practices

-

22. Programme of laboratories

A laboratory session required for adhesive technology design, where the relationship between different parameters of the adhesive bond and their effects on the properties of the bond are explored. In addition, students participate in a visit to a laser technology laboratory, where they can see theoretical knowledge 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 main system elements and characteristics of the presented procedures, the process steps and the relationships between them, the process, inputs and outputs necessary for technology design in the presented areas.

b) skills (k)

1. Is able to develop system components and processes of the described procedures and solve emerging technological challenges.

c) attitude (a)

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

d) autonomy and responsibility (o)

1. Can participate responsibly in solving independent tasks.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Student assignment	1. ZH 2. HF	1. 0% 2. 15%	1. t1,k1 2. k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. V	1. 85%	1. t1,k1

26. Criteria to obtain a signature / midterm grade

During the semester the midterm test has to be completed with more the 50 % of the maximal points. In the semester participation in labs is mandatory and the student assignment is required to be delivered to an acceptable level. The condition of the signature is the correspondingly qualified midterm test, fulfilment of all lab activities and assignment 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 CoS.

29. Retake and delayed completion

The midterm test can be retaken once, the homework can be resubmitted 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	**Measurement methods**				
2. Subject name in Hungarian	Mérési módszerek			3. Programme	J
4. Subject code	**BMEKOVJMSJ3001-00**			5. Term | role	**3 | k**
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	8 hours	Homework	26 hours
Reading written materials	30 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. Béda Péter, Devecz János				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Learning the measurement techniques and data processing needed for lifetime computation

20. Programme of lectures

Data processing: one and two parameter procedures, rain-flow procedure.
Frequency domain analysis.
Damage parameters, damage analysis.

21. Programme of practices

Team project using software from the current lecture topics: data processing. Examples, project consultation.

22. Programme of laboratories

Practicing the subject materials discussed by solving examples on computer.

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 basic methods of data measurement and processing. (T3,T4,T5,T9)
2. Knows the measurement techniques and measurement theory for research purposes in the field of vehicles and mobile machines. (T3,T4,T5,T9)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T3,T4,T5,T9)

b) skills (k)

1. Able to design a measurement and data processing process and to participate in any substep of that process. (K2,K3,K10,K11,K12)
2. Able to process, organise, analyse and draw conclusions from information collected during the implementation of vehicle and mobile machine systems and processes. (K2,K3,K10,K11,K12)
3. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machines. (K2,K3,K10,K11,K12)
4. Able to contribute original ideas to the knowledge base of the field. (K2,K3,K10,K11,K12)
5. Able to perform quality assurance, metrology and process control tasks in vehicle and mobile machine systems. (K2,K3,K10,K11,K12)
6. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K2,K3,K10,K11,K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines.

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods.

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. 17% 2. 17% 3. 66%	1. t1-3,k1-k5,a1,o1 2. t1-3,k1-k5,a1,o1 3. t1-3,k1-k5,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

The midterm test and the two 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 midterm grade:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homeworks and the 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

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, 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	**Measurement methods and data processing**				
2. Subject name in Hungarian	Méréstechnika és adatfeldolgozás			3. Programme	J
4. Subject code	**BMEKOVJMSJ3E02-00**			5. Term │ role	**3 │ 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	26 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. Béda Péter, Devecz János		

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

19. Purpose

Learning the measurement techniques and data processing needed for lifetime computation

20. Programme of lectures

Data processing: one and two parameter procedures, rain-flow procedure.
Frequency domain analysis.
Damage parameters, damage analysis.

21. Programme of practices

Team project using software from the current lecture topics: data processing. Examples, project 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. Knows and understands the basic methods of data measurement and processing.
2. Knows the measurement techniques and measurement theory for research purposes in the field of vehicles and mobile machines. (T9)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to design a measurement and data processing process and to participate in any substep of that process.
2. Able to process, organise, analyse and draw conclusions from information collected during the implementation of vehicle and mobile machine systems and processes. (K4)
3. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machines. (K6)
4. Able to contribute original ideas to the knowledge base of the field. (K7)
5. Able to perform quality assurance, metrology and process control tasks in vehicle and mobile machine systems. (K11)
6. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

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. 17% 2. 17% 3. 66%	1. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1 2. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1 3. t1, t2, t3, k1, k2, k3, k4, k5, a1, o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

The midterm test and the two 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 midterm grade:

- attendance of 70% of the practice classes;
- each homework is submitted and accepted;
- the sum of the homeworks and the 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

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, 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	**Measurement systems in vehicle manufacturing**				
2. Subject name in Hungarian	Mérési rendszerek a járműgyártásban			3. Programme	J
4. Subject code	**BMEKOGJMSJ3G02-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	15 hours	Homework	15 hours
Reading written materials	8 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. 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. Markovits Tamás, Dr. Bánlaki Pál				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

This course provides comprehensive training in metrological principles and industrial measurement technologies. It begins with fundamental metrological concepts, covering measurement methodologies, error analysis (including systematic and random errors), and the laws of error propagation. Students will explore characteristic measurement tasks and their corresponding instruments, with emphasis on measurement system design—both at the component level and within broader production systems. The curriculum addresses tool management for measurement devices, automated dimensional inspection, and surface digitization techniques. A significant focus is placed on in-process metrology for critical parameters (temperature, vibration, force, torque, etc.) and their monitoring systems. The course concludes with instrument calibration and certification protocols, ensuring compliance with international quality standards.

20. Programme of lectures

The course covers fundamental metrology concepts, measurement methods, and error analysis - including systematic errors, random errors, and the principles of error propagation. It examines characteristic measurement tasks and their corresponding instrumentation, along with measurement system design at both the process system and workpiece levels. Key topics include measurement tool management, automated dimensional inspection, and surface digitization techniques. The curriculum also addresses in-process metrology for critical parameters (temperature, vibration, force, torque, etc.) and their monitoring systems, concluding with measurement instrument calibration and certification procedures.

21. Programme of practices

-

22. Programme of laboratories

The lab sessions involve experimental studies employing diverse measurement techniques. Participants develop competencies in measurement execution, parameter analysis, and the complete data workflow from acquisition through processing to final interpretation.

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 measurement procedures and equipments used inthe course of vehicle manufacturin processes, the theoretical basics of metrology, the problems to be solved in the XXI. century, and the demands connected tp to Industry 4.0 progress.

b) skills (k)

1. Is able to apply the learnt procedures and equipments in a professional way, and to support the related research and development processes.

c) attitude (a)

1. 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, applies responsibly the knowledge acquired during the course with regard to their validity limits.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Measured data collection and recording 3. Oral report	1. ZH 2. LAB 3. SZB	1. 0% 2. 15% 3. 85%	1. t1,k1 2. 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 the midterm test and competent execution of measurement assignments with full documentation of records, furthermore completing the oral report.

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 CoS.

29. Retake and delayed completion

The midterm exam can be substituted twice, the supplementation of the written work and the oral report is possible during the delayed completion week.

30. Consultation

Every lecture

31. Learning materials

Slides and presentation 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	**Numerical methods of lifetime planning**				
2. Subject name in Hungarian	Élettartamra méretezés numerikus módszerei			3. Programme	J
4. Subject code	**BMEKOVJMSJ2E02-00**			5. Term │ role	**2/1 │ sp**
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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE				
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	20 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. Béda Péter, Devecz János				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Learning the numerical methods needed for lifetime computation

20. Programme of lectures

Theoretical basics of fatigue simulation. Modern finite element techniques: condensed model applications, non-linear model parameters, non-linearly describable models.

21. Programme of practices

Team project using software from the current lecture topics: fatigue model analysis. CAD model modification based on feedback from computation results. Examples, project 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. Knows and understands the numerical methods of lifetime design.
2. Knows and understands the tools and methods of computer modelling and simulation related to vehicle and mobile machines. (T10)
3. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to solve problems with numerical tools in the domain of lifetime design.
2. Able to process, organise, analyse and draw conclusions from information collected during the implementation of vehicle and mobile machinery systems and processes. (K4)
3. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machinery. (K6)
4. Able to contribute original ideas to the knowledge base of the field. (K7)
5. Able to apply and develop procedures, models and information technologies used in the design, implementation and operation of vehicle and mobile machinery systems. (K10)
6. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF1	1. 17%	1. t1, t2, t3, k1, k2, k3, k4, a1, o1
2. homework	2. HF2	2. 17%	2. t1, t2, t3, k1, k2, k3, k4, a1, o1
3. midterm test	3. ZH	3. 16%	3. t1, t2, t3, k1, k2, k3, k4, a1, o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	1. 50%	1. t1,t2,t3,k1,k2,k3,k4,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

The midterm test and the two 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 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

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, 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	**Project management**				
2. Subject name in Hungarian	Projekt menedzsment			3. Programme	J
4. Subject code	**BMEKOGJMSJ1001-00**			5. Term | role	**1/2 | 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	28 hours	Homework	22 hours
Reading written materials	24 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. Lelkes Márk senior lecturer	15. Email address	lelkes.mark@kjk.bme.hu
16. ...organisational unit	Department of Automotive Technologies		
17. Instructor(s)	Ács Sándor, Böhm Ádám, Dénes Róbert, Gergely Balázs, Hanó Csaba, Kalincsák Ferenc, Karakas Balázs, Kohnen Laura Hédi, Kotán Sándor, Orbán Ede Gyula, Ónody Attila Károly, Dr. Sipos Tibor, Veres Péter		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

The course is taught by engineers and project managers from the Bosch Group's development center in Hungary. The course aims to prepare students for future project management tasks and active work as project members. Students will learn about modern project management (hereinafter: PM) methods used by the world's leading automotive company in its own developments. In addition to introducing PM tools, the course also covers more common project management skills in various topics.

20. Programme of lectures

Through specific industry examples, students can learn in detail about:
- the different PM models
- the basic concepts and definitions related to PM
- the project types (plan-based, agile and hybrid)
- the basics of preparing a project's time, cost and resource plan
- the main stages of the project life cycle
- the sample phase-dependent and -independent PM activities
- some quality assurance methods applied in automotive projects
- requirements management
- the basics of risk management

21. Programme of practices

Practicing the knowledge of 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 following areas: Communication. Stakeholder management. Requirements management. Scope management. WBS (work breakdown structure). Schedule management. Resource management. Cost management. Procurement. Risk management. Integration. Documentation management. Quality assurance. (T4-T6,T11,T12)

b) skills (k)

1. is able to: Prepare time, cost and resource plans for projects. Plan and conduct simpler projects with the acquired knowledge. Purchase products and services required for projects. Analyze and manage risks in projects. Apply quality assurance elements. Prepare project documentation. Communicate fluently within and outside the project. (K6,K12-K14)

c) attitude (a)

1. is open to teamwork, which facilitates effective cooperation with specialists from other fields. (A1,A3-A5)

d) autonomy and responsibility (o)

1. utilizes the acquired knowledge in future jobs, projects, thesis or other scientific activities.
2. takes responsibility for the full management of projects, making decisions, and directing the work of participants.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Team homework	1. ZH 2. HF	1. 50% 2. 50%	1. t1,k1 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 test, presenting the team homework.

27. Grading rules

50%-61%: pass
62-74%: satisfactory
75%-87%: good
88%-100%: excellent

28. Attendance and participation requirements

According to CoS.

29. Retake and delayed completion

The midterm test can be retaken once, the homework can be resubmitted once.

30. Consultation

After the lectures or the practices, and in specified time slots previously agreed appoinment.

31. Learning materials

Presentation slides and electronic aids.

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	**Project plan (automotive)**				
2. Subject name in Hungarian	Projekt tervezés (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ1B01-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	28 hours	Homework	36 hours
Reading written materials	0 hours	Midterm preparation	0 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 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 organization and scheduling of an engineering project through an example design task.

20. Programme of lectures

Automotive projects, the relationship between engineering development and research, the impact of requirements systems, time management, control options, teamwork.

21. Programme of practices

-

22. Programme of laboratories

Modeling automotive development processes with the involvement of industrial partners.

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

The student

a) knowledge (t)

1. During the semester's design project, learns about the project management tools necessary to complete the task.

b) skills (k)

1. Through the example of the semester' design project, is able to organize, conduct, and control an automotive development process project.

c) attitude (a)

1. Is open to teamwork, which facilitates effective cooperation with specialists from other fields.

d) autonomy and responsibility (o)

1. Is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project	1. TF	1. 15%	1. k1,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade	27. Grading rules

Accepted semester design project.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to CoS.	
29. Retake and delayed completion	
Re-submitting a semester design project during the delayed completion week.	
30. Consultation	
Every week.	
31. Learning materials	
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	**Quality, safety and homologation**				
2. Subject name in Hungarian	Minőség, biztonság és jóváhagyás			3. Programme	J
4. Subject code	**BMEKORHMSJ4001-00**			5. Term | role	**4/3 | k**
6. Credits	**5**	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	4 QUALITY EDUCATION	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	11 SUSTAINABLE CITIES AND COMMUNITIES	13 CLIMATE ACTION	

12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	42 hours	Preparation for lessons	28 hours	Homework	40 hours
Reading written materials	40 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, Dr. Török Árpád, Dr. Szabó Géza		

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

19. Purpose

The aim of the course is to familiarize the student with the final phase of development processes occurring in vehicle engineering practice, implementation, testing and verification, and their basic requirements.

20. Programme of lectures

Basics of structural design, product testing, validation.

21. Programme of practices

Team project using software from the current lecture topics. Examples, project 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 the knowledge to realize, produce, test and validate the product.

b) skills (k)

1. performs independent and self-critic engineering work, create solution options, and propose and design optimal solutions.

c) attitude (a)

1. takes into account design requirements: standards, regulations/legislation, accepts design conditions and works in accordance with and adheres to them.

d) autonomy and responsibility (o)

1. is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project	1. TF	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	27. Grading rules

Accepted semester design project.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to CoS.	
29. Retake and delayed completion	
Re-submitting a semester design project during the delayed completion week.	

30. Consultation

Every week.

31. Learning materials

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	**Railway vehicle design 1.**				
2. Subject name in Hungarian	Vasúti járművek tervezése 1.			3. Programme	J
4. Subject code	**BMEKOVJMSJ1A02-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	14 hours	Homework	55 hours
Reading written materials	25 hours	Midterm preparation	0 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 at designing railway vehicles and start of their analysis

20. Programme of lectures

Theoretical aspects and practical technologies of railway vehicle design

21. Programme of practices

-

22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the theoretical and practical foundations of railway vehicle design and production
2. understand the sources and methods of further learning in the railway vehicle design and production area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the railway vehicle design and production and use the necessary IT tools
2. is able to use the knowledge acquired in the railway industry

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 1 2. homework 2	1. HF1 2. HF2	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes

<table>
<tr><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="3">26. Criteria to obtain a signature / midterm grade</td><td>27. Grading rules</td></tr>
<tr><td colspan="3">successful completion of the two homeworks</td><td rowspan="5">Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%</td></tr>
<tr><td colspan="3">28. Attendance and participation requirements</td></tr>
<tr><td colspan="3">according to the rules of CoS</td></tr>
<tr><td colspan="3">29. Retake and delayed completion</td></tr>
<tr><td colspan="3">Second retake or delayed completion for both midterm requirements.</td></tr>
<tr><td colspan="4">30. Consultation</td></tr>
<tr><td colspan="4">at a time and in a form agreed with the teacher</td></tr>
<tr><td colspan="4">31. Learning materials</td></tr>
<tr><td colspan="4">Presentation slides</td></tr>
<tr><td colspan="4">32. Start of validity for the subject decription</td></tr>
<tr><td colspan="4">September 1st, 2025</td></tr>
</table>

1. Subject name	**Railway vehicle design 2.**				
2. Subject name in Hungarian	Vasúti járművek tervezése 2.			3. Programme	J
4. Subject code	**BMEKOVJMSJ2A01-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**1 lecture**	**0 practice**	**3 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	14 hours	Homework	55 hours
Reading written materials	25 hours	Midterm preparation	0 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 analyse railway vehicles

20. Programme of lectures

Theoretical aspects and practical technologies of railway vehicle design

21. Programme of practices

-

22. Programme of laboratories

Computer calculation tasks related to theoretical 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 and understands the theoretical and practical foundations of railway vehicle design and production
2. understand the sources and methods of further learning in the railway vehicle design and production area

b) skills (k)

1. is able to summarise and illustrate the activities carried out in the railway vehicle design and production and use the necessary IT tools
2. is able to use the knowledge acquired in the railway industry

c) attitude (a)

1. strives for precise, aesthetic, clear and transparent documentation
2. is interested, responsive, meets deadlines

d) autonomy and responsibility (o)

1. is be able to produce documentation independently
2. understands the importance of their work and the consequences of errors

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework 1 2. homework 2	1. HF1 2. HF2	1. 50% 2. 50%	1. t1,t2,k1,k2,a1,a2,o1,o2 2. t1,t2,k1,k2,a1,a2,o1,o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes

<table>
<tr><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="3">26. Criteria to obtain a signature / midterm grade</td><td>27. Grading rules</td></tr>
<tr><td colspan="3">successful completion of the two homeworks</td><td rowspan="5">Excellent 80-100%
Good 70-79%
Satisfactory 60-69%
Pass 50-59%
Fail 0-49%</td></tr>
<tr><td colspan="3">28. Attendance and participation requirements</td></tr>
<tr><td colspan="3">according to the rules of CoS</td></tr>
<tr><td colspan="3">29. Retake and delayed completion</td></tr>
<tr><td colspan="3">Second retake or delayed completion for both midterm requirements.</td></tr>
<tr><td colspan="4">30. Consultation</td></tr>
<tr><td colspan="4">at a time and in a form agreed with the teacher</td></tr>
<tr><td colspan="4">31. Learning materials</td></tr>
<tr><td colspan="4">Presentation slides</td></tr>
<tr><td colspan="4">32. Start of validity for the subject decription</td></tr>
<tr><td colspan="4">September 1st, 2025</td></tr>
</table>

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

Subject description

1. Subject name	**Railway vehicle measurement techniques and laboratory**				
2. Subject name in Hungarian	Vasúti jármű méréstechnika és labor			3. Programme	J
4. Subject code	**BMEKOVJMSJ3A01-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 7 AFFORDABLE AND CLEAN ENERGY; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 17 PARTNERSHIPS FOR THE 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	34 hours	Midterm preparation	24 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 introduce students to the measurement equipment, materials, methods and digital signal processing techniques of railway vehicles.

20. Programme of lectures

Concept of the signal. Classification of signals. Measurement transducers: dynamometers, distance meters, accelerometers, pressure gauges, gauges, microphones and temperature sensors. Data acquisition and recording equipment. Data conversions, evaluation of the signals. Evaluation of deterministic, periodic, transient and stochastic signals. Fourier transform, autocorrelation and spectral density functions. The scope of the railway technical basic measurements: determination of vertical wheel forces, of driving forces. Measurement processes for the determination of riding quality and safety of running. Measuring of the running dynamic and energetic. Measuring processes of the traction force on wheel or on hitching, of basic and track resistance. Measurements of brake systems. Strength measurements using strain gauges on railway vehicles.

21. Programme of practices

-

22. Programme of laboratories

Selection of measuring instruments in the laboratory, compilation of the measuring system, setting up the measuring software, calibration of the instruments and carrying out the measurement activity. Analysis and evaluation of measurement results. Carrying out measurements at an industrial partner on a bogie for training purposes.

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 sensors and other devices used in measurement technique, as well as their possibilities and conditions for railway applications.
2. Knows the measurement procedures and evaluation methods used during the investigation of railway vehicles.
3. Knows the processing methods of signals gathered during the measurement of railway vehicles.

b) skills (k)

1.Is able to identify the quantities to be measured and the evaluation methods to be used in a given railway measurement.

2. Is able to select the tools for a given measurement task, to compile a simple measurement system, to perform and evaluate the measurement.

3. Is able to choose a method for processing and evaluating a measurement result related to a railway vehicles and to perform the evaluation using simple methods.

c) attitude (a)

1. Is open and receptive to learning about and communicating the development and innovation in the field of railway vehicle measurement technique.

2. Strives for a complex approach to processes based on a systemic approach.

d) autonomy and responsibility (o)

1. Decides independently on the selection of the measurement devices to be used
2. Takes on responsibility for compliance with the procedures it has applied.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. 1. Assignment: Evaluation of measurement results 3. 2. Assignment: Evaluation of measurement results 4. 3. Assignment: Evaluation of measurement results	1. ZH 2. F1 3. F2 4. F3	1. 55% 2. 15% 3. 15% 4. 15%	1. t1,k1,k2,o1,o2 2. t2,t3,k2,k3,a1,o1 3. t2,t3,k2,k3,a1,o1 4. t2,t3,k2,k3,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 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

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	**Railway vehicle system dynamics**				
2. Subject name in Hungarian	Vasúti járműrendszer-dinamika			3. Programme	J
4. Subject code	**BMEKOVJMSJ2A02-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**3 lecture**	**1 practice**	**0 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	18 hours	Homework	0 hours
Reading written materials	24 hours	Midterm preparation	24 hours	Exam preparation	28 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				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Understanding the basics of the dynamic processes of the railway vehicle and track-vehicle system

20. Programme of lectures

The railway vehicle as a dynamical system. Main motion and parasitic motions. Railway vehicle vibration analysis. Analysis of the spring and damper elements using the characteristic surface above the state space. The wheel-rail rolling contact. Eigen-frequencies and stability reserves, limit cycles and chaotic motions. The non-linear models. The wheel-rail wear process. The track-vehicle system dynamics. Definition and measurement of track irregularities. Spectral characteristics of the track irregularities. Parameter sensitivity of the track-vehicle system. Parameter optimization. Measurement procedures for examining the vehicle-track system processes.

21. Programme of practices

Solving computation tasks connected with the themes of 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. Understands and applies the mathematical and natural science principles, relationships, and procedures necessary for the field of railway vehicle dynamics.
2. Understands and applies the theories and terminologies developed in the field of railway vehicle dynamics to a wide extent.
3. Knows and understands in detail the data collection methods and problem-solving techniques of railway vehicle dynamics.
4. Knows and understands the tools and methods of computer modeling and simulation that can be used in railway vehicle dynamics.
5. Knows the problem-solving techniques that can be used in research or scientific work.

b) skills (k)

1. Is able to recognize vehicle dynamics problems, select and apply the necessary procedure for treatment.
2. Is able to solve simple vehicle dynamics problems numerically.

c) attitude (a)

1. Is interested in learning more about technical issues related to vehicle dynamics.
2. Is interested in new technical solutions in the field.

d) autonomy and responsibility (o)

1. Expresses an independent opinion on issues related to vehicle dynamics.
2. Takes responsibility for the adequacy of the procedures he applies.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. midterm test 2. mifterm test	1. ZH1 2. ZH2	1. 20% 2. 20%	1. t1, t2, k1, a1, a2, o1, o2 2. t3, k2, k3, a1, a2, o1, o2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 60%	1. t1-t5,k1,k2, a1, a2, o1, o2

26. Criteria to obtain a signature / midterm grade

During the semester there are 2 midterm tests. The condition for obtaining the signature is: at least satisfactory completion of each of the two 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 of CoS

29. Retake and delayed completion

The midterm tests can be repair separately one by one during the repalation and the repeated reparation.

30. Consultation

at a time and in a form agreed with the teacher

31. Learning materials

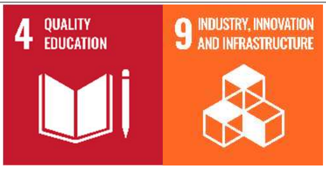
Simonyi A.: Railway vehicle dynamics (in Hungarian), Közlekedési dokumentációs Kft., Bp. 1996
Lecture notes
Zobory I.- Szabó A.: Vehicle dynamics and drive dynamics I., Vechicle dynamics (in Hungarian), Typotex Kiadó (www.tankonyvtar.hu), 2011.
Zobory I.: Vehicle dynamics - Linear time variant dyínamic systems (in Hungarian). Tanszéki segédlet.

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	**Requirement definition and collect design requirements (automotive)**				
2. Subject name in Hungarian	Követelmények meghatározása és tervezési követelmények (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ1B02-00**			5. Term │ role	**1/2 │ sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	28 hours	Homework	66 hours
Reading written materials	0 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. 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 subject is to familiarize the student with the requirements of engineering work/design. Establishing a system of requirements, which includes the legal framework, the application of standards, and the steps of creating technical documentation.

20. Programme of lectures

Introduction to the phases of engineering design. Learning about legal frameworks and standards, performing and documenting calculations, and preparing technical documentation.

21. Programme of practices

-

22. Programme of laboratories

Establishing a system of requirements for a design task and formulating boundary conditions.

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 identifies an engineering problem, makes a proposal (for construction), and demonstrates feasibility with technical design documentation.

b) skills (k)

1. becomes capable of performing independent engineering work, is able to recognize technical problems and formulate design requirements.

c) attitude (a)

1. takes into account design requirements: standards, regulations/legislation, accepts design conditions and works in accordance with and adheres to them.

d) autonomy and responsibility (o)

1. is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project	1. TF	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

Attending lectures and submitting semester design project.

27. Grading rules

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

28. Attendance and participation requirements

30% of lectures can be missed.

29. Retake and delayed completion

Re-submitting a semester design project during the delayed completion week.

30. Consultation

Every week.

31. Learning materials

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	**Ship design**						
2. Subject name in Hungarian	Hajótervezés					3. Programme	J
4. Subject code	**BMEKORHMSJ2C01-00**					5. Term | role	**2/1 | sp**
6. Credits	**6**	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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION						
12. Working hours for fulfilling the requirements of the subject							**180 hours**
Contact hours	70 hours	Preparation for lessons		40 hours		Homework	40 hours
Reading written materials	10 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. Simongáti Győző						
18. Indicative prerequisites	- - -, - - -, - - -						

19. Purpose

The aim of the course is to synthesise the knowledge previously acquired in the subject "Pleasure craft" at BSc level by introducing the process of pleasure craft design.

20. Programme of lectures

Ship design methods. Design spiral. Conceptual design. Economical aspects of ship design. Determination of main dimensions. Weight estimation. Dedsign of Lines. Freeboard and subdivision. Design of propulsion systems, selection of machinery.

21. Programme of practices

Worked examples for supporting the theory.

22. Programme of laboratories

Tender plan preparation in a computer 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 and understands the theoretical and practical process of commercial ship design,
2. knowledge of the range of input parameters, boundary conditions and approximate calculation methods used for preliminary design

b) skills (k)

1. can, on the basis of the knowledge of a general design task, determine the main dimensions of a vessel, draw up the general arrangement and a simplified technical description, draw up a lines plan, prepare task-specific preliminary plans
2. is able to make maximum use of and benefit from computer tools (Internet, design software, calculation support applications)

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. midterm test 2. homework (preparing a tender design for a vessel of a given deadweight from the definition of the main dimensions to the general arrangement)	1. ZH 2. F1	1. 20% 2. 80%	1. t1-2,k1-2,a1-2,o1-2 2. t1-2,k1-2,a1-2,o1-2

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

Péter Pál Lehel: Hajótervezés (in Hungarian)
Watson: Practical Ship Design (Elsevier, 1998)
Papanikolaou: Ship Design-Methodologies of Preliminary Design (Springer, 2014)
case studies

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 hydrodynamics**				
2. Subject name in Hungarian	Hajó-hidrodinamikai számítások			3. Programme	J
4. Subject code	**BMEKORHMSJ3C02-00**			5. Term | role	**3 | sp**
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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**90 hours**
Contact hours	28 hours	Preparation for lessons	10 hours	Homework	20 hours
Reading written materials	12 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, Kiss-Nagy Krisztián				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to acquire naval architect knowledge in the field of ship hydrodynamic calculations.

20. Programme of lectures

1 Introduction of numerical and analytical calculation methods for determining of hull resistance, wave, speed and pressure field around the hull.

2 Basics of ship specific numerical fluid dynamics calculations, international recommendations for calculation parameters and methods.

3 Numerical fluid dynamics calculations to determine hull resistance, rudder or keel forces.

4 The method of propeller design and defining propeller open water characteristics.

21. Programme of practices

-

22. Programme of laboratories

In laboratory practice, students are trained to determine ship resistance and rudder forces using computer programs.

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 fundamentals of numerical and analytical computational fluid dynamics methods for the determination of hull resistance, waveform and the velocity and pressure field around the vessel.

2.Knows the basics of numerical flow calculations with specific ship parameters and methods based on international recommendations.

3. Knows and understands the method of propeller design using the vortex theory and the determination of the operating characteristics of the propeller.

b) skills (k)

1. Is able to apply advanced ship-specific numerical flow parameters in a finite element program to determine hull resistance and forces on the rudder or keel.

2. Is able to design a propeller according to vortex theory.

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. homework (preparing a ship hydrodynamic calculation) 2. oral report	1. F1 2. SZB	1. 80% 2. 20%	1. t1-3,k1-2,a1-2,o1-2 2. t1-2
25. Exams			
Name	**Code**	**Share in final grade**	**Evaluated learning outcomes**
-	-	-	-

26. Criteria to obtain a signature / midterm grade	**27. Grading rules**
submission of assignment on time or on lessons, and completion of oral report	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 for the midterm requirements.	

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	**Ship motions**				
2. Subject name in Hungarian	Hajók dinamikája			**3. Programme**	J
4. Subject code	**BMEKORHMSJ1C02-00**			**5. Term │ role**	**1/2 │ sp**
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**	20 hours	**Homework**	35 hours
Reading written materials	20 hours	**Midterm preparation**	0 hours	**Exam preparation**	35 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 acquire naval architect knowledge in the field of ship motions.

20. Programme of lectures

Coordinate systems of ships and their relationship. Motion equations of ships based on Newtonian mechanics. Maneuvering, seakeeping and autopilot system theory. Principles and calculation of added masses. Methods for representation of external forces in motion equations. Determination methods of external force derivatives. Elemental maneuvers with motion equations. Basics principles of wave equations amd wave spectra. Ship vibrations, accelerations and comfort factors in seakeeping analysis. Vibration damping systems.

21. Programme of practices

Practicing ship motion calculations by solving numerical examples.

22. Programme of laboratories

Manoeuvring and seakeeping investigation in computer 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 and understands the coordinate systems used in describing ship motions and their relationships.
2. Knows and understands the derivation of ship equations of motion based on Newtonian mechanics.
3. Knows and understands the concept of coupled inertias and their basic calculation methods.
4. Knows and understands the oscillation forms of ships and their calculation using the equations of motion.
5. Knows and understands the calculation of elementary maneuvers using the equations of motion based on the general theory of maneuvers.
6. Knows and understands the basics of wave equations and wave spectra.
7. Knows and understands the principle of calculating ship vibrations, accelerations and comfort factors in seaworthiness tests.
8. Knows and understands the principle and structure of shock absorber systems used on ships.

b) skills (k)

1. Can perform seakeeping analysis using a computer program.
2. Can calculate the expected maneuvring characteristics of a ship.
3. Can prepare documentation on the seakeeping and maneuverability characteristics of a ship.
4. Can prepare a simple maneuver simulation program.

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. homework (preparing a manoeuvring simulation programme)	1. F1	1. 50%	1. t1-8,k1-4,a1-2,o1-2 2. t1-8,k1-4,a1-2,o1-2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. written exam	1. V	1. 50%	1. t1-2

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
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 stregth**				
2. Subject name in Hungarian	Hajószilárdsági számítások			3. Programme	J
4. Subject code	**BMEKORHMSJ2C02-00**			5. Term | role	**2/1 | 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	56 hours	Preparation for lessons	10 hours	Homework	20 hours
Reading written materials	14 hours	Midterm preparation	0 hours	Exam preparation	20 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 synthesise the knowledge previously acquired in the subject "Ship structures" at BSc level.

20. Programme of lectures

1 Ship structure model types.
2 The ship specific details of numerical strength calculation methods, and its special parameters by ships.
3 Numerical strength calculation methods to determine global and local ship structure loads.
4 Conformity of hull strength in accordance with applicable laws, standards and rules of ship classification societies.

21. Programme of practices

Students are practicing ship strength calculations by analitical and numerical computation methods, based on rules of ship classification societies, national/ international laws and standards.

22. Programme of laboratories

Students are practicing hull strength calculation with computer programs.

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

The student

a) knowledge (t)

1. Has knowledge and understanding of the theoretical and practical process of strength design of ships.
2. Knows the types of ship structure strength models.
3. Knows the fundamentals of numerical strength calculations specific to ships and the ship-specific parameters of the calculations.
4. Knows the methodology for determining global and local loads on ships.
5. knows the system of legislation, standards and classification society specifications applicable to the various types of ships for the control of soundness and their structure.

b) skills (k)

1. applies the theoretical and practical process of hull strength calculation.
2. applies the hull structure modells for strength calculation, is familiar with the basics of numerical strength calculation methods, and the calculations of ship-specific parameters.
3. applies the methodology for defining global and local hull loads.
4. applies the system and the structure of the laws, standards and classification regulations applicable to ship strength calculations.

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. homework (preparing a ship strength calculation)	1. F1	1. 80%	1. t1-5,k1-4,a1-2,o1-2 2. t1-5,k1-4,a1-2,o1-2

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. V	0,2	t1-2

26. Criteria to obtain a signature / midterm grade

submission of assignment 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 or delayed completion for the 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	**Ship theory and propulsion**				
2. Subject name in Hungarian	Hajók elmélete és hajtása			3. Programme	J
4. Subject code	**BMEKORHMSJ1C01-00**			5. Term | role	**1/2 | 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	10 hours	Homework	40 hours
Reading written materials	8 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. Simongáti Győző, Dr. Hargitai L. Csaba				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to supplement the knowledge of the courses with a similar name on the BSc with additional, higher level knowledge.

20. Programme of lectures

Floatation and stability of damaged and grounded ships. Floodable length calculation. Deterministic and probabilistic methods for calculation of damaged stability. Stability of unconventional ships (such as split barges, floating cranes, etc.)

21. Programme of practices

-

22. Programme of laboratories

Stability calculations of different vessel types.

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 methods used to determine the floating position of a vessel in water.
2. Has knowledge and understanding of the methods used to determine the buoyancy of a recovering vessel.
3. Has knowledge and understanding of the methods applicable to determining the stability of a ship in a bluff.
4. Has knowledge and understanding of the methods applicable to determining the stability of a recovering vessel.
5. Has knowledge and understanding of the method for determining the maximum floodable length.
6. Has knowledge and understanding of both deterministic and probabilistic stability calculation methods.
7. Knows and understands at least the method for calculating the stability of floating cranes and opening barges.
8. Knows and understands how to use design support software that applies the above methods.
9. Has knowledge and understanding of the system of stability requirements for damaged vessels.
10. Has knowledge of the requirements for documenting calculations.

b) skills (k)

1. is able to find and interpret relevant rules,
2. is able to perform damaged stability calculations and prapare documentation,
3. is able to interpret the results of calculations from the designers point of view

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 of the tasks assigned

d) autonomy and responsibility (o)

1. complies 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. midterm test 2. homework (loss of stability-related ship accident case study)	1. ZH 2. F1	1. 75% 2. 25%	1. t1-9,k1-3,a1-2,o1-2 2. t1-9

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	**Simulation and verification (automotive)**				
2. Subject name in Hungarian	Szimuláció és ellenőrzés (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ2B02-00**			5. Term | role	**2/1 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES; 13 CLIMATE ACTION				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	28 hours	Homework	46 hours
Reading written materials	0 hours	Midterm preparation	0 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 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 familiarize the student with the typial automotive modeling and simulation processes.

20. Programme of lectures

Definition of model and system. Steps of modeling. Verification, calibration, validation. Evaluation and documentation of results. Typical modeling and simulation tasks.

21. Programme of practices

-

22. Programme of laboratories

Engine and vehicle dyno measurements' modeling and simulation, modeling of drivetrain systems and suspension systems.

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

The student

a) knowledge (t)

1. gets the knowledge to use the necessary simulation sysems and tools.

b) skills (k)

1. performs independent and self-critic engineering work, create solution options, and propose and design optimal solutions.

c) attitude (a)

1. takes into account design requirements: standards, regulations/legislation, accepts design conditions and works in accordance with and adheres to them.

d) autonomy and responsibility (o)

1. is able to work independently, adheres to design requirements, prepares authentic technical design documentation, and takes responsibility for the own work.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Semester design project	1. TF	1. 50%	1. t1,k1,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade | **27. Grading rules**

Accepted semester design project.	Excellent: 81-100%; Good: 71-80%; Satisfactory: 61-70%; Pass: 50-60%; Fail: 0-49%
28. Attendance and participation requirements	
According to CoS.	
29. Retake and delayed completion	
Re-submitting a semester design project during the delayed completion week.	
30. Consultation	
Every week.	
31. Learning materials	
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	**Statistical basics of lifetime planning**				
2. Subject name in Hungarian	Élettartam tervezés statisztikai alapjai			3. Programme	J
4. Subject code	**BMEKOVJMSJ1E01-00**			5. Term │ role	**1/2 │ sp**
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	20 hours	Homework	30 hours
Reading written materials	14 hours	Midterm preparation	20 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. Sipos Tibor				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Getting the basic statistical knowledge for lifetime computation

20. Programme of lectures

Basics of mathematical statistics: variables, distribution, density. Hypothesis testing. Linear regression, variance analysis.
Basics of probability calculation: concept of probability variable. Expected value, standard deviation.
Types of practical distributions. Concept of probability process. Realization, marginal distribution.

21. Programme of practices

Problem solving with software from the current lecture topics. Individual homework.

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. Understands and knows the basic notions of mathematical statistics and probability.
2. Understands and applies the general and specific mathematical, natural and social science principles, rules, contexts and procedures relevant to the mechanical engineering domain and to the profession of automotive engineer.
3. Knows and understands the methodology and tools for the design and research of vehicles and mobile machines. (T8)
4. Knows and understands the specific methods and technologies of the chosen specialisation. (T14)

b) skills (k)

1. Able to formulate and perform basic probability problems.
2. Able to contribute creatively to the solution of research and development tasks in the field of vehicles and mobile machinery. (K6)
3. Able to contribute original ideas to the knowledge base of the field. (K7)
4. Able to design complex systems based on a systematic thinking and process-oriented approach. (K9)
5. Depending on the chosen specialisation, able to carry out condition assessments and on the basis of these, develop, plan, organise and manage complex vehicle and mobile machine systems at a high level. (K12)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)
2. Seeks to contribute to the development of new methods and tools related to vehicles and mobile machines. Has deep sense of vocation. (A3)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. homework	1. HF1	1. 8,3%	1. t1, t2, k1, k2, o1
2. homework	2. HF2	2. 8,3%	2. t1, t2, k1, k2, o1
3. homework	3. HF3	3. 8,3%	3. t1, t2, k1, k2, o1
4. homework	4. HF4	4. 8,3%	4. t1, t2, k1, k2, o1
5. homework	5. HF5	5. 8,3%	5. t1, t2, k1, k2, o1
6. homework	6. HF6	6. 8,3%	6. t1, t2, k1, k2, o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	1. 50%	1. t1,t2,t3,k1,k2,k3,k4,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

The six 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 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

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, 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	**Surface engineering**				
2. Subject name in Hungarian	Felületi technológiák			3. Programme	J
4. Subject code	**BMEKOGJMSJ1G02-00**			5. Term │ role	**1/2 │ sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 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					**150 hours**
Contact hours	56 hours	Preparation for lessons	20 hours	Homework	20 hours
Reading written materials	20 hours	Midterm preparation	20 hours	Exam preparation	14 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. Markovits Tamás, Dr. Hlinka József				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to introduce the main surface properties, modification procedures and qualification methods of components used in manufacturing.

20. Programme of lectures

Interpretation of basic phenomena related to different surfaces and their effects (e.g. wetting). Overview of methods used to modify different surface layer properties. Description of the parameters and relationships of the plasma beam process. Presentation of the main system elements and their characteristics within the field of laser beam material processing (beam source, beam guidance, focusing). Description of the characteristics of laser-material interaction. Detailed presentation of laser surface treatment methods (hardening, annealing, coating, alloying, dispersion).

21. Programme of practices

-

22. Programme of laboratories

Students will be given a semester-long homework assignment related to surface technologies, which they must complete by the end of the semester through regular consultation. In addition, students will participate in a lab visit, during which they will be able to apply the knowledge acquired in the theoretical curriculum 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 main system elements and characteristics of the presented procedures, the process steps and the relationships between them, the process, inputs and outputs necessary for technology design in the presented areas.

b) skills (k)

1. Is able to develop system components and processes of the described procedures and solve emerging technological challenges.

c) attitude (a)

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

d) autonomy and responsibility (o)

1. Can participate responsibly in solving independent tasks.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Student assignment	1. ZH 2. HF	1. 0% 2. 15%	1. t1,k1 2. k1,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. Written exam	1. V	1. 85%	1. t1,k1

26. Criteria to obtain a signature / midterm grade

During the semester the midterm test has to be completed with more the 50 % of the maximal points. In the semester participation in labs is mandatory and the student assignment is required to be delivered to an acceptable level. The condition of the signature is the correspondingly qualified midterm test, fulfilment of all lab activities and the assignment 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 CoS.

29. Retake and delayed completion

The midterm test can be retaken once, the homework can be resubmitted 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	**System integration**				
2. Subject name in Hungarian	Rendszerintegráció			3. Programme	J
4. Subject code	**BMEKOKJMSJ2001-00**			5. Term | role	**2/1 | 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	20 hours	Homework	23 hours
Reading written materials	10 hours	Midterm preparation	0 hours	Exam preparation	25 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

To equip students with a systems-level mindset, forming the foundation for modeling, design, and control of mechatronic systems.

20. Programme of lectures

The course introduces the basics of systems thinking, the steps of functional architecture design, the V-model framework, and the application of programming to model mechatronic systems. Emphasis is placed on control process modeling and exploring relationships between systems and subsystems. Theoretical content is complemented by practical examples and industrial applications.

21. Programme of practices

Students complete modeling and architecture design tasks using one programming environment. The goal is to develop a system integration mindset through hands-on problems.

22. Programme of laboratories

Labs focus on the development of functional architectures and control models in a development framework, applied to simulated system environments.

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

The student

a) knowledge (t)

1. Understands and can widely apply the developed theories, relationships and terminologies of the field of vehicles and mobile machines. (T3)
2. Knows and understands the basic boundaries of the activity system of the technical field, as well as the expected directions of development in vehicle technology. (T4)
3. Knows the basic concepts and terminology of related fields (e.g. IT, electronics, quality assurance) related to the control and design of mechatronic systems. (T6)

b) skills (k)

1. Is able to recognize and evaluate the relationships and mechanisms of action between vehicle and mobile machine systems, and to treat them from a systems perspective. (K5,K11)
2. Is able to model the behavior of complex mechatronic systems in Python and design functional architectures. (K2, K9)
3. Is able to apply integrated knowledge from several fields, with particular regard to the relationships between electronics, IT and process theory. (K8)

c) attitude (a)

1. Strives to conduct his/her work based on a systems perspective and process-oriented thinking perform it in a complex approach. (A6)

d) autonomy and responsibility (o)

1. Make decisions carefully, in consultation with representatives of other fields, independently, and with full responsibility. (O2)

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. individual project assignment	1. F	1. 50%	1. t1,t2,t3,k1,k2,k3,a1,o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. oral exam	1. SZV	1. 50%	1. t1,t2,t3,k1,k2,k3,a1,o1

26. Criteria to obtain a signature / midterm grade

The completed and documented work will be submitted by the student at the end of the semester, and will be presented in form of oral exam.

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 individual project assignment can be handed in until the end of the delayed competion week with a penalty fee

30. Consultation

Consultation is available by prior arrangement with the instructor.

31. Learning materials

Learning is supported by lecture slides, Python-based code examples, case studies, and practical lab exercises.

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 modeling and simulations**				
2. Subject name in Hungarian	Műszaki modellezés és szimulációk			3. Programme	J
4. Subject code	**BMEKOVJMSJ1001-00**			5. Term │ role	**1/2 │ k**
6. Credits	**5**	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					**150 hours**
Contact hours	42 hours	Preparation for lessons	20 hours	Homework	40 hours
Reading written materials	18 hours	Midterm preparation	20 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. 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, Devecz János				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

Understanding the principles of the continuum mechanics and the finite element method

20. Programme of lectures

The basics of continuum mechanics. Description of deformation. Internal forces and equations of motion. The elastic body. Basics of approximation methods. Mechanical fundamentals of finite element method.

21. Programme of practices

Team project from the current lecture topics. Examples, project consultation.

22. Programme of laboratories

Team project using software from the current lecture topics. Guided exercises, simulation.

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

The student

a) knowledge (t)

1. Understands and applies a wide range of theories, contexts and terminology in the field of vehicles and mobile machines.(T3)
2. Knows and understands in detail the knowledge acquisition and data collection methods, their ethical limitations and problem-solving techniques in the technical field.(T5)
3. Knows and understands the tools and methods of computer modelling and simulation related to vehicle and mobile machines. (T10)

b) skills (k)

1. Able to apply the theories and related terminology of a given technical domain in an innovative way to solve problems. (K2)
2. Able to test and analyse methods in the field of vehicles and mobile machines, and to evaluate and document test results . (K3)
3. Able to process, organise, analyse and draw conclusions from information collected during the implementation of vehicle and mobile machinery systems and processes. (K4)
4. Able to apply and develop procedures, models and information technologies used in the design, implementation and operation of vehicle and mobile machinery systems. (K10)

c) attitude (a)

1. Open and receptive to learning about, adopting and authentically communicating professional, technological development and innovation in the field of vehicles and mobile machines. (A1)
2. Seeks to contribute to the development of new methods and tools related to vehicles and mobile machines. Has deep sense of vocation. (A3)

d) autonomy and responsibility (o)

1. Takes initiative in solving professional problems and independently selects and applies relevant problem-solving methods. (O1)

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. 17% 2. 17% 3. 16%	1. t1, t2, t3, k1, k2, a1, a2, o1 2. t1, t2, t3, k1, k2, a1, a2, o1 3. t1, t2,t3, k1, k2, a1, a2, o1

25. Exams

Name	Code	Share in final grade	Evaluated learning outcomes
1. exam	1. V	1. 50%	1. t1,t2,t3,k1,k2,k3,k4,a1,a2,o1

26. Criteria to obtain a signature / midterm grade

The tests and the 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 homework and 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

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

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	**Testing and validation (automotive)**				
2. Subject name in Hungarian	Tesztelés és érvényesítés (autómérnök)			3. Programme	J
4. Subject code	**BMEKOGJMSJ3B02-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
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	10 hours	Midterm preparation	48 hours	Exam preparation	0 hours
13. Organisational unit in charge	Department of Automotive Technologies				
14. Subject coordinator and its position	Dr. Török Árpád tudományos főmunatárs		15. Email address	torok.arpad@kjk.bme.hu	
16. …organisational unit	Department of Automotive Technologies				
17. Instructor(s)	Dr. Török Árpád, Dr. Pethő Zsombor, Kazár Tamás Márton				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The course aims to equip students with the principles, tools, and methodologies of advanced vehicle instrumentation and testing. It emphasizes laboratory, simulation-based, and real-world measurements, enabling students to independently conduct and assess vehicle system tests in accordance with modern development and testing frameworks. In many cases, the lessons are held at external locations, at companies involved in advanced development and testing.

20. Programme of lectures

Introduction to test and validation. Environment perception in test and validation. Vehicular communication related safety issues. Testing Vehicle Emission. Testing concept for electric cars. Testing concept for V2X systems. Testing ADAS. Testing electric machines I. Testing electric machines II. Battery safety. Homologation. Safe SW development.

21. Programme of practices

-

22. Programme of laboratories

Deeper understanding and mastery of the topics covered in the lecture in an industrial 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 how measuring systems work and how the measurements under consideration are carried out,
2. is familiar with standardised validation procedures,
3. is familiar with modern test methods for passenger cars and commercial vehicles,
4. knows the different levels of vehicle systems testing, laboratory, simulation and test track measurements
5. is familiar with the principles of Model V based development, as applied in the automotive industry

b) skills (k)

1. is able to understand an automotive testing process,
2. is able to design and implement an automotive test process

c) attitude (a)

1. is open to working in a project-based approach,
2. is open to planning in a team

d) autonomy and responsibility (o)

1. takes responsibility for the done works

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Oral report	1. D 2. SZB	1. 50% 2. 50%	1. t1-t5,k1-k2 2. t1-t5,k1-k2,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 test and completing the oral report.

27. Grading rules

0%-49%: fail
50%-61%: pass
62-74%: satisfactory
75%-87%: good
88%-100%: excellent

28. Attendance and participation requirements

According to CoS.

29. Retake and delayed completion

Both the midterm test and the oral report can be retaken once.

30. Consultation

After the lectures or the practices, and in specified time slots previously agreed appoinment.

31. Learning materials

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	**Traction mechanics and energetics**				
2. Subject name in Hungarian	Vontatási mechanika és energetika			3. Programme	J
4. Subject code	**BMEKOVJMSJ3A02-00**			5. Term | role	**3 | 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	4 QUALITY EDUCATION; 7 AFFORDABLE AND CLEAN ENERGY; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES				
12. Working hours for fulfilling the requirements of the subject					**120 hours**
Contact hours	42 hours	Preparation for lessons	8 hours	Homework	28 hours
Reading written materials	10 hours	Midterm preparation	32 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, Dr. Tulipánt Gergely		
18. Indicative prerequisites	- - -, - - -, - - -		

19. Purpose

To acquaint the students with the characteristics and calculation methods of train mechanics, energetics and the longitudinal dynamics of trains.

20. Programme of lectures

Movement factors of the train: the traction force, the brake force, the track-force. The control of the traction and brake effort by the control of the torsion affairs of the rotational system. Determination of the train mass which can be start-moved by traction unit; the construction of the Koreff-diagram. Determination of the velocity-time diagram by dynamical model based simulation. Consideration of the limit-force which can be transferred in the rolling contact. The train as a longitudinal swingsystem. The dynamic of the train-tear. The dynamic of the special train movements: the shunting, the sorting, the sorting hump. Energy requirement to move the train, the simulation of the energy consumption in cases of the diesel and electric traction. Outlook on the question of the energy-optimal train-control, the principle of the determination of the optimal tractive and brake effort, the numerical implementation of the latter.

21. Programme of practices

Processing of the numerical data and characteristic curves of the vehicles and tracks. Integration methods of the train motion equation in MATLAB environment. Computation of the energy consumption of the train motion realized by the diesel and electric vehicles. Numerical processing and graphical representation of the characteristic surfaces of the longitudinal structure connections. Numerical realization of the optimal train movement in MATLAB environment. Determination and analyzation of the movement diagrams of the special train movements. Determining data for construction of the schedule.

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. Understands and applies the mathematical and scientific principles and procedures related to the traction of trains
2. Understands and applies the theories and terminologies developed for the field of train traction
3. Knows and understands the basic facts, limits and development opportunities of train traction
4. Knows and understands the transport, logistics, environmental, occupational and fire safety aspects related to train traction
5. Knows and understands information and communication technology related to train movement
6. Knows and understands the methods of computer modelling and simulation related to train traction

b) skills (k)

1. Is able to apply the mathematical and mathematical principles and procedures of natural sciences
2. Is able to analyse and evaluate the methods used in the field of train forwarding
3. Is able to apply integrated knowledge in the field of train forwarding

c) attitude (a)

1. Is open and receptive to learning about and communicating the development and innovation in the field of train mechanics. Characterised by deep sense of vocation.
2. Strives for a complex approach to processes based on a systemic approach.

d) autonomy and responsibility (o)

1. Independently expresses its opinion on the issues of traction mechanics and energetics
2. Takes on responsibility for the compliance of the procedures applied.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Midterm test 2. Assignment 3. Presentation	1. ZH 2. F1 3. P	1. 25% 2. 50% 3. 25%	1. t1,t2,t3,a1 2. t4,t5,t6,k1,k2,k3,a2,o2 3. t6,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 test (min. 50%) and doing the presentation.

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 and the presentation can be retaken, and it can be made up in the framework of repeated replacement, as well.

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	**Traction unit systems**				
2. Subject name in Hungarian	Vontatójármű rendszerek			3. Programme	J
4. Subject code	**BMEKOVJMSJ1A01-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**e**	8. Nature	**contact lessons**
9. Weekly contact hours	**3 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					**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	- - -, - - -, - - -				

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

-

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. 25% 2. 25%	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
1. Exam	1. E	1. 50%	1. t1,t2,k1-k3,a1-a3,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 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	**Vehicle manufacturing technology project**				
2. Subject name in Hungarian	Járműgyártás technológia projekt			3. Programme	J
4. Subject code	**BMEKOGJMSJ1G01-00**			5. Term | role	**1/2 | sp**
6. Credits	**5**	7. Evaluation type	**m**	8. Nature	**contact lessons**
9. Weekly contact hours	**2 lecture**	**0 practice**	**2 laboratory**	10. Language	**English**
11. SDG Learning outcomes' contribution to the EU/UN sustainable development goals	4 QUALITY EDUCATION; 8 DECENT WORK AND ECONOMIC GROWTH; 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION; 17 PARTNERSHIPS FOR THE GOALS				
12. Working hours for fulfilling the requirements of the subject					**150 hours**
Contact hours	56 hours	Preparation for lessons	20 hours	Homework	50 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. 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. Markovits Tamás, Dr. Herczeg Szabolcs, Dr. Hlinka József, Dr. Varga Ferenc László, Erőss László Dániel				
18. Indicative prerequisites	- - -, - - -, - - -				

19. Purpose

The aim of the course is to enable the student to understand, plan and carry out an R&D development task. In the course the student will prepare an individual assignment with the help of a lead tutor. In carrying out the assignment, the student will conduct a literature search, design experiments/measurements, perform experiments/measurements and document these in a form to be submitted. The student will prepare and give a presentation of the results.

20. Programme of lectures

In this course the student is involved in an industrial R&D process or scientific research project related to manufacturing technology or materials technology in the department to learn the topic and the related phrases with the help of the project leader lecturer.

21. Programme of practices

-

22. Programme of laboratories

The lab sections involve experiments and measurements as part of a project in the department.

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

The student

a) knowledge (t)

1. gains knowledge of the project process and its planning, sub-tasking and scheduling, knowledge of experimental design and methods for evaluating measurement data.

b) skills (k)

1. Is able to work in a team or independently, depending on the complexity of the task, to plan, break down and schedule a project process, to plan and carry out experiments, measurements and to process and interpret the results, to summarise the results of the sub-task undertaken, either orally or in writing, to collect literature on a focal issue related to the project task and to prepare a summary based on this literature.

c) attitude (a)

1. Strives to apply what is learned in the exercises to the project assignment, is open to cooperate with the instructor and fellow students, strives to improve communication.

d) autonomy and responsibility (o)

1. Accepts the framework of the subject and performs the tasks independently and responsibly within it, in accordance with ethical standards; is aware that the success of the project depends on the student and therefore accepts the tasks with this in mind; tries to carry out the task assigned to the student independently and to the best of the student's ability, seeking help from the supervisor when necessary; applies the knowledge acquired in the course of the subject responsibly, taking into account the limits of its validity.

24. Midterm assessments

Name	Code	Share in final grade	Evaluated learning outcomes
1. Attending consultations 2. Individual assignment and oral presentaion	1. KR 2. FB	0. 0% 2. 100%	1. t1,k1,a1 2. k1,a1,o1

25. Exams

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

26. Criteria to obtain a signature / midterm grade

Attending consultations and oral presentation of individual assignment.

28. Attendance and participation requirements

30% of consultations can be missed.

29. Retake and delayed completion

Re-submitting and presentation of individual assignment 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 week.

31. Learning materials

Lecture notes or, depending on the project task, individually agreed sources.

32. Start of validity for the subject decription

September 1st, 2025