

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

**VEHICLE ENGINEER  
BACHELOR TRAINING PROGRAMME**

**The training programme was adopted by the Senate by Decision №  
.../2024-2025. (VI.30.), in force for students starting as of Autumn for  
2025/2026 academic year.**

<p style="text-align: center;"><b>I.</b> <b>TRAINING AND OUTCOME REQUIREMENTS</b></p>
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The training and outcome requirements for the training programme as a whole are set out in the Ministerial Communication (hereinafter referred to as the "KKK" or "KKK Communication"). The training programme contains both the requirements of the KKK and the *specific requirements of the curriculum of the training programme as actually implemented (where the KKK allows for deviations or sets limits) or supplemented by the curriculum of the training programme maintained by the Faculty of Transport Engineering and Vehicle Engineering.* (The numbering of each point and sub-point is the same as in the KKK.)

**1. Basic characteristics of the training programme**

1. The name of the bachelor training programme: Vehicle Engineering
2. Level of qualification obtained in the bachelor training programme and indication of the qualification in the diploma:
  - level of qualification: bachelor, abbreviation: BSc
  - classification: Vehicle Engineer
3. Field of study: engineering
4. Programme duration in terms: 7 terms
5. Number of credits required to obtain the bachelor degree: 210 credits
  - orientation of the training programme: balanced (40-60 percent) >> **54%**<sup>1</sup>
  - the number of credits allocated to the bachelor thesis: 15 credits
  - the minimum number of credits to be allocated to the optional subjects: 10 credits >> **12 credits**
6. Classification of fields of study according to the uniform classification of fields of vocational education and training:
  - European Qualification Framework level: 6**
  - Hungarian Qualification Framework level: 6**
  - ISCED-F 2013 classification: 525/0716 Design and manufacturing of motor vehicles, ships and aircraft**
7. Training objectives and professional competences of the bachelor training programme  
The aim of the training programme is to train vehicle engineers who are capable of solving basic engineering tasks related to the design, manufacture, system operation and repair of road (passenger and commercial vehicles), rail, water and air vehicles, vehicle systems and mobile machinery, as well as construction and material handling machinery, taking into account the specificities of transport, transportation and logistics processes. They are able to carry out these tasks with due regard for safety, environmental protection and energy management. They are prepared to continue their studies at master level.
  - 7.1. The professional competences to be acquired
    - 7.1.1. The Vehicle Engineer's
      - a) knowledge  
He/she
        - has an expansive knowledge of the basic facts, directions and borderlines of the professional field of engineering.
        - knows the general and specific principles, rules, relations and procedures of mathematics, natural and social sciences necessary to work in the professional field of

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<sup>1</sup> Az orientáció százalékos értéke: a tantervi tantárgyak együttes gyakorlati és laboratóriumi gyakorlati óraszámának, valamint az összóraszámnak a hányadosa. (lásd KKK 1. melléklet 5. bek. c) pontja)

vehicles and mobile machinery.

- knows the conceptual system and the problem-solving methods of the professional field of vehicles and mobile machinery.
- knows the basic economic, entrepreneurial and legal rules and devices related to the manufacturing and operation of vehicles and mobile machinery.
- knows the fundamentals, limits and requirements of the professional fields of logistics and transportation closely associated with vehicle engineering.
- knows the logistics and transport processes carried out by using vehicles and mobile machinery as well as their necessities, expectations and the set of conditions.
- knows the working principles and structural units of vehicles and mobile machinery.
- knows the measurement technologies used in vehicle technology, as well as their tools, instruments and measurement facilities.
- knows the basic principles of design, methods, regulations and standards of vehicle technology, as well as the control techniques and operation processes.
- knows the learning and the information and data collection methods of the field of vehicle engineering, as well as their ethical limits and problem-solving methods.
- knows computer communication and the major application software of the professional field.
- knows the major organisational, management and communication techniques.
- knows the expectations and the requirements of the fields of work and fire safety, industrial safety and quality assurance, and the regulations of environmental protection related to his/her profession

#### b) skills

He/She is able to

- carry out a basic analysis of disciplines that make up the epistemic system of the field of engineering, to summarise correspondences and to make adequate assessments.
  - apply the most important theories, procedures and terminology of the field of vehicles and mobile machinery when carrying out relevant tasks.
  - apply calculation and operational principles, methods and technical specifications related to the operation and basic design of vehicles, mobile machinery and their systems.
  - understand and describe the structure and operation of the different units of vehicles and mobile machinery, the construction of the applied constituents and the relation between them.
  - apply the technical regulations relating to the operation of automotive systems and mobile machinery, and the principles and economical relations of installing and operating machines and mechanical systems.
  - control and supervise industrial manufacturing and operational processes without neglecting the principles of quality assurance and quality control.
  - diagnose mechanical failures and to select preventive mechanisms.
  - identify routine problems and the theoretical and practical background necessary to solve them, and to solve the given problem by the practical application of standard operations.
- plan, organise and carry out studying independently.
- understand and use scientific literature and the computer and library sources related to the field of vehicles and mobile machinery.
  - solve professional problems by using the acquired computer skills.
  - model engineering structures and processes.
  - manage workplace resources in a creative way using his/her knowledge acquired.
  - apply and conform to industrial safety, workplace and fire safety and hygienic rules and regulations in the course of his/her work.

communicate in a professionally adequate manner both in writing and orally in his/her mother tongue and in at least one foreign language.

c) attitude

He/she

- identifies with the social role his/her profession plays in the world, and acts as a credible representative of it.
- represents and takes responsibility for the values of engineering, and is open towards professionally reasonable critical remarks.
- follows the legal, technical, technological and administrative changes of his/her field of profession.
- is open and apt to learn, accept and credibly mediate professional and technological developments and innovations in the field of vehicle engineering.
- endeavours to constantly train him-/herself in vehicle engineering in accordance with his/her profession.
- endeavours to solve problems and make leadership decisions by taking into account the opinion of his/her co-workers and cooperating with them.
- makes decisions after a thorough consideration of legal and ethical norms even in unexpected situations, or situations demanding a complex approach.
- endeavours to promote the aspects of environmental protection and health consciousness at his/her job.
- pays attention to the professional development of his/her co-workers, manages and helps their endeavours.
- shares experiences with his/her colleagues helping their professional development.

d) autonomy and responsibility

He/she

- is capable of considering complex, fundamental questions of his/her field of profession and elaborating them on the basis of given sources even in unexpected decision-making situations.
- cooperates with experts from other fields of profession (primarily experts of economics and law) when completing professional tasks.
- detects deficiencies of the applied technologies and the risks of the processes and initiates measures to reduce them.
- is fully aware of the legal, economic, safety, social, health and environmental consequences of his/her work and decisions.
- is capable of following the instructions of his/her superior, supervises the work of personnel he/she is in charge of and monitors the operation of machines and facilities.
- evaluates the efficiency, adeptness and safety of his/her colleagues.

8. Characteristics of the bachelor training programme

8.1. Professional characteristics

8.1.1. The disciplines and specialisations leading to the qualification, from which the degree is drawn:

- natural science knowledge 40-50 credits; >> **48 credits**
  - **mathematics 16 credits**
  - **technical chemistry 3 credits**
  - **mechanics, electrotechnics thermodynamics and fluid mechanics 29 credits**
- economic and social science knowledge 14-30 credits; >> **15 credits**
  - **quality management, management and entrepreneurship economics 9 credits**
  - **basics of project working 3 credits**
  - **other economic and social science knowledge 3 credits**
- vehicle engineering professional knowledge 70-105 credits, of which >> **79 credits**

- structure, equipments and operation of vehicles and mobile machineries 10-25 credits, >> **12 credits**
- design, manufacturing and maintenance of vehicle and drive elements 25-40 credits, >> **27 credits**
- informatics, vehicle control 10-25 credits, >> **11 credits**
- specific professional fields of vehicles and mobile machineries 25-50 credits. >> **29 credits**

8.1.2. Taking into account the elective specialisations, specific knowledge can be acquired in areas of specialisation appropriate to the needs of the profession of vehicle engineer: >>

- **automotive**
- **vehicle mechatronics**
- **ships**
- **vehicle manufacturing**
- **railway vehicles**
- **aircrafts**

The specialisation recommended by the training institution within the training as a whole must be at least 40 credits. >> **47 credits**

## 8.2. Requirements for the traineeship

The traineeship must last at least six weeks and must be organised in a work placement. The traineeship is a criterion requirement.

<b>II.</b> <b>SPECIFIC CHARACTERISTICS OF THE TRAINING PROGRAMME</b>
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**1. The comprehensive organisational unit responsible for the training programme**  
Faculty of Transportation Engineering and Vehicle Engineering

**2. The person responsible for the programme**  
Dr. Árpád VERESS (lecturer ID: 71958375749)

**3. Curricular requirements and prerequisite system:**

**3.1. Prerequisite of subject registering:**

The system of prerequisites for the subjects expresses the interrelationship between the subjects. There is an indicative system of pre-requisites for the subjects, which characterises the depth of the links between the subjects.

In the absence of strong and weak prerequisites, the subject is not recommended for enrolment. In the case of co-requisite, a subject linked to a prerequisite may be taken concurrently with the subject it is building on in the same semester. The recommended prerequisite subject reflects a looser connection between the subjects, and the learning outcomes of the subsequent subject can be achieved with some additional time.

**3.2. General conditions for choosing specialisations and modules and for taking up specialisation subjects:**

Earn a minimum of 75 credits from the compulsory subjects of the curriculum (including the compulsory electives in economics and human sciences and the specialised compulsory electives).

Further conditions choosing the Automotive specialisation:

- Fulfilling the Mathematics A1a (xxx), Mathematics A2a (xxx), Mathematics A3j (xxx), Mechanics 1 (xxx), Mechanics 2 (xxx), Fluid dynamics, thermodynamics and heat transfer 1. (xxx), Basic theories of engineering (xxx), Material science and technology (xxx), and Manufacturing (xxx) subjects, and 35 students with the best average in the autumn semester and 5 students with the best average in the spring semester can be admitted to the specialisation (if the last places are occupied by students with the same average, they will be ranked according to the number of credits obtained in their respective courses according to the recommended curriculum).

As part of the curriculum, in semesters 5 and 6, students are required to choose from three different modules depending on their intended career path:

- company placement (recommended for students who are already employed but do not intend to continue their studies)

- university placement (recommended for students who are not yet employed but do not intend to continue their studies)

- MSc Theory (recommended for students who have no work experience but wish to continue their studies)

and complete the required subjects or have work experience recognised as appropriate to the module.

**3.3. General conditions for admission to the subject "Bachelor thesis" in all specialisations:**

A minimum of 170 credits from compulsory and compulsory elective subjects, including a minimum of 31 credits from specialisation subjects, and the completion of a 6-week traineeship.

**3.4. Advanced level subjects:**

The Mathematics A1a and Mathematics A2a subjects can be fulfilled on advanced level.

**3.5. Evaluation and assessment**

The evaluation and assessment methods, procedures and rules are set out in the subject descriptions (subject datasheet) in force, in accordance with the current Code of Studies.

**3.6. Term designated for student mobility:**

The student has the possibility to participate in international student mobility in the term designated for this purpose in the recommended curriculum, provided that the conditions set out in the Code of Studies are met, the subjects completed in the framework of mobility will be recognised as being the subjects due for the term of the recommended curriculum which the student would have been entitled to take.

**3.7. Conditions for obtaining the leaving certificate and for entering the final examination:**

The conditions for obtaining a leaving certificate are set out in the Code of Studies, within the legal framework. Within this framework, it is necessary to fulfil all the following criteria:

Completion of all the subjects set out in the recommended curriculum, including the elective subjects (minimum 210 credits), all the curricular criteria (2 semesters of physical education, 6 weeks of traineeship) and the submission of the bachelor thesis.

**3.8. Choice of subjects for the final examination, order of the final examination:**

The final examination in front of the Final Examination Board consists of the defence of the bachelor thesis and an oral examination in three final examination subjects (or subject groups). The final examination subjects or subject groups shall be selected by the Department responsible for the specialisation. The subjects shall be chosen partly from the core professional curriculum and partly from the specialisation subject area, so that each subject is worth at least 3 credits and the total of the three subjects (groups) is worth at least 15 credits.

**3.9. Recommended curriculum, compulsory and elective subjects, curriculum code:**

The recommended curriculum is a distribution of the subjects and criteria requirements in the curriculum into terms that a student who wishes to progress at an average pace can follow by meeting the indicative prerequisites for the admission of all subjects, so that he/she can complete his/her study requirements within the programme duration specified in the training and outcome requirements; to be admitted and completed in the terms of training.

The compulsory elective subjects in economics and human sciences, the specialised compulsory elective subjects and the elective subjects set out in the curriculum and announced in the current term are available in the study system.

As part of the training programme, students must complete four major compulsory elective subjects. The student may choose the subjects at his/her discretion from among those announced in the current semester. The Faculty offers at least sixteen major

compulsory elective subjects in the framework of the training programme. The current list of subjects is available on the Faculty website: <https://transportation.bme.hu/>  
The current list of elective subjects is available on the faculty website: <https://transportation.bme.hu/>  
The indicative subject prerequisites are displayed on the subject datasheets.  
Code of the model curriculum in the study system: xxx



## Recommended curriculum of the training programme

	I.	II.	III.	IV.	V.	VI.	VII.
1	Mathematics A1a	Mathematics A2a	Mathematics A3)	Artificial intelligence	Heat engines and fluid machines 1.	Heat engines and fluid machines 2.	Maintenance, repair and modernisation
2	TE90AX00	TE90AX02		SM	JM	JM	JM RHT
3			TT	AI KJIT	1 1 0 e 3 SZT RHT	1 1 0 e 3 SZT RHT	1 0 1 m 3 SZT GJT
4			2 2 0 m 4 TT AI TTK	Fluid dynamics, thermodynamics and heat transfer 2	Vehicle and drive elements 2	Major compulsory elective course 3	Major compulsory elective course 4
5	4 2 0 e 6 TT AI TTK	4 2 0 e 6 TT AI TTK	Fluid dynamics, thermodynamics and heat transfer 1.	SM	JO	SP	SP
6				SZT RHT	1 2 0 e 3 SZT VJUT	1 1 0 m 3 SZK	1 1 0 m 3 SZK
7	Technical chemistry	Electrotechnics - Electronics		1 1 1 e 4	Compulsory elective economics and human science 2.	Specialisation	Elective course 3.
8	VEKTA01	KOKAA139	TT	SZT RHT	GH		2 0 0 m 3 SZV
9	2 0 1 e 3 AI VBK		1 2 1 e 4 AI RHT	Mechanics 3.	1 1 0 m 3 KV GTK		Elective course 4.
10	Basic theories of engineering		Control engineering	TT	Specialisation		2 0 0 m 3 SZV
11				SZT VJUT			2 0 0 m 3 SZV
12			INF	Vehicle and drive elements 1.			Specialisation
13			AI KJIT				1 1 0 m 3 SP
14		Mechanics 1	2 1 0 m 4	JO			BACHELOR THESIS
15			AI KJIT	SZT VJUT			
16	2 2 2 m 7 TT AI VJUT	2 2 0 e 4 TT AI VJUT	Mechanics 2.	2 3 0 m 6 SZT VJUT			
17	Programming	Material science and technology	2 2 0 e 5 SZT RHT	Specialisation			
18	KOKAA146		Engineering drawing 2.				
19			JO				
20			1 2 1 m 4 SZT VJUT				
21			2 1 0 e 3 SZT GJT				
22	2 0 4 m 7 INF AI KJIT	4 1 1 e 6 SZT GJT	Manufacturing				
23		Engineering drawing 1.	2 1 0 e 3 SZT GJT				
24	Fundamentals of mobility		Major compulsory elective course 2.				
25			SP				
26	3 0 1 m 4 SM RHT	2 2 0 m 5 SZT VJUT	1 1 0 m 3 SZK				
27	Compulsory elective economics and human science 1.	Major compulsory elective course 1.	Elective course 1.				
28	GH	JM					
29	1 1 0 m 3 KV GTK	1 1 0 m 3 SZK	2 0 0 m 3 SZV	4 3 4 e 14 SP	0 2 3 m 5 GH 1kr KV	1 4 2 m 9 GH 1kr KV	0 8 0 m 15 OP
30	Mathematics G1F (Elective course 1.)	Physical education					
31		s	KR TK				
32	0 2 0 m 3 AI TTK						
33	Physical education						
	s	KR TK					

BK	basic knowledge
PK	professional knowledge
MA	major compulsory elective course
CE	compulsory elective economics and human science course
EC	elective course
SP	specialization
MI	minor elective course
CR	criteria requirement
	term for student mobility

## Recommended curriculum of specialisations

### Automotive specialisation

Automotive engines 1.	Automotive engines 2.	Vehicle operation	Professional networking
	1 1 0 e 3 SP GJT	1 1 1 m 4 SP GJT	1 1 0 m 3 SP GJT
	Automotive drivelines and vehicle subsystems	Automotive electronics	
2 2 2 e 7 SP GJT		1 2 0 m 4 SP GJT	
Fundamentals of vehicle dynamics	3 1 2 m 6 SP GJT	Noise, vibration and harshness	
1 0 2 m 4 SP GJT		1 1 1 m 4 SP GJT	
Automotive structure and design			
1 1 0 m 3 SP GJT			

### Vehicle mechatronics specialisation

Vehicle on-board systems 1.	Vehicle on-board systems 2.	Mechatronics of mobile machinery	Reliability and safety
	2 1 2 e 5 SP KJIT	1 1 2 m 5 SP KJIT	1 1 0 m 3 SP KJIT
Sensors and actuators	Vehicle control 1.	Machine learning	
1 1 2 m 5 SP KJIT	2 1 0 m 4 SP KJIT	0 2 0 m 3 SP KJIT	
On-board vehicle communication		Vehicle control 2.	
2 0 1 m 4 SP KJIT		2 1 0 e 4 SP KJIT	

### Ships specialisation

Basic ship theory	Propulsion of ships	Pleasure craft	Ship electronics systems
	2 1 1 e 5 SP RHT	1 1 1 e 4 SP RHT	1 1 0 m 3 SP RHT
	Ship machinery	Ship construction	
2 2 3 e 8 SP RHT	2 1 1 m 4 SP RHT	1 2 0 m 4 SP RHT	
Resistance of ships		Ship structures	
1 1 1 e 3 SP RHT		1 1 1 m 4 SP RHT	
Operation of ships			
1 0 0 m 3 SP RHT			

### Vehicle manufacturing specialisation

Materials of vehicles	Vehicle manufacturing processes 2.	Manufacturing automation and digitalization	Automotive assembly technology
	2 2 2 e 6 SP GJT		1 1 0 m 3 SP GJT
	Quality improvement methods in the automotive industry		
2 2 1 m 6 SP GJT	2 0 0 m 3 SP GJT	2 2 2 e 9 SP GJT	
Vehicle manufacturing processes 1.		Technological diagnostics	
		1 2 0 m 3 SP GJT	
2 2 2 e 8 SP GJT			

#### Railway vehicles specialisation

Railway vehicle structures 1.	Railway vehicle structures 2.	Maintenance and reparation of railway vehicles	Railway vehicle mechatronics
2 2 1 e 6 SP VJJT	2 1 1 m 5 SP VJJT	1 1 1 e 4 SP VJJT	1 1 0 m 3 SP VJJT
Electric motive trains	Diesel motion power	Operation and diagnostics of railway vehicles	
	2 1 1 e 4 SP VJJT	1 1 0 m 3 SP VJJT	
		Modern locomotives	
2 1 3 e 8 SP VJJT		1 2 1 m 5 SP VJJT	

#### Aircrafts specialisation

Aerodynamics	Flight mechanics and aero structures	Greening and flight safety	Aircraft design and manufacturing
1 1 1 m 4 SP RHT		1 1 0 m 3 SP RHT	1 1 0 m 3 SP RHT
Aviation ecosystem	2 2 1 e 6 SP RHT	Aircraft systems and avionics	
1 0 2 e 4 SP RHT	Aircraft maintenance and documentation		
Propulsion and aircraft engines	2 0 1 m 3 SP RHT		
		2 3 2 e 9 SP RHT	
2 1 2 e 6 SP RHT			

<p style="text-align: center;"><b>III.</b> <b>SUBJECT DATASHEETS</b></p>
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The currently valid subject catalogue is available on the faculty website: <https://transportation.bme.hu/>