



KANDÓ KÁLMÁN DOCTORAL SCHOOL
STUDY PLAN

Valid for students enrolling from 01.09.2024.

I. Relevant laws and regulations

The study plan is based on and was prepared with accordance of the 2011. CCIV act on national higher education (Nftv.), the 387/2012 (XII.19.) Government Decree on the doctoral schools, the order of doctoral procedures and habilitation, the BME Doctoral and Habilitation Regulations (DHSZ), the BME Code of Studies and Exams (TVSZ) and the Operational Regulations of Kandó Kálmán Doctoral School.

II. History and matching the university education

During the development of the study plan, it was taken into account that the Kandó Kálmán Doctoral School was established by the transformation of the former Kandó Kálmán Graduate School of Mechanical Sciences (Vehicles and Mobile Machinery) (formerly Multidisciplinary Technical Sciences) and as the successor to the Baross Gábor School of Transportation Sciences. Accordingly, transportation and vehicle sciences includes the relevant elements of the related logistics and engineering (vehicle) sciences.

The courses in the Doctoral School are integral part and build on the current BSc and MSc programs of transportation engineering, logistic engineering, vehicle engineering, and autonomous vehicle control engineering at the Faculty of Transportation Engineering and Vehicle Engineering. The program covers two key areas: a high-level knowledge in science, a high-level of theoretical expertise, and specific subjects in mechanical (vehicle) sciences (vehicles and mobile machines), transport and vehicle sciences and logistics sciences.

III. Doctoral Program

1. Supervisor

Independent research work in topics announced by the Doctoral School is the most important part of the doctoral program. Each PhD student has one and only one supervisor, who manages and assists the PhD student with full responsibility working on his/her studies, research work, and preparation for obtaining the PhD degree. Dual supervision is only possible in case of a program in the framework of an international cooperation or in case of an interdisciplinary research based on that the topic is accepted by the Doctoral School Council (DIT) and published with the prior consent of the University Habilitation Committee and Doctoral Council (EHBDT).¹

A full-time employee of an institution that has a cooperation agreement for doctoral training with the University is considered an external supervisor, for who the DIT appoints an internal consultant, who assists the work of the supervisor from the University and monitors the professional progress of the PhD student.²

¹ BME DHSZ 10. §. (6)

² BME DHSZ 10. §. (4)

2. Program structure

The program includes guided education, during which the PhD student develops presentation and communication skills with the guidance of a designated teacher. The subject is appointed by the supervisor and is certified by the designated teacher. The tutoring nature of the program is underlined by the regular consultation recognized with credits, support for research and publication activities. The PhD student's level of preparation and activity during the consultations will be assessed by the supervisor with a grade each semester. The PhD student presents his/her scientific work and progress to the Faculty Scientific Committee in the form of a report at the end of each semester.

In the second phase of the program, the emphasis is on research, publishing results and preparing a dissertation. Research credits recognize the publication of new results in international journals or at international conferences (presentation or poster) as well as the study visits and research work with a foreign partner in international cooperation. The supervisor acknowledges with the credits given to the publication activity that by the end of the fourth semester the condition for admission to the complex exam is fulfilled, and that by the end of the eighth semester the minimum requirements for obtaining the PhD degree are met. Receiving the research credits is conditional on the presentation of the results achieved during the study period.

3. Work plan

Enrolment to each semester is based on an individual work plan, which must be created according to the requirements of the Doctoral School. In the first active semester, the work plan agreed with the supervisor must be submitted to the Dean's Office by the end of the third week of the semester and until the end of the registration period in the following semesters. If the student does not submit his/her work plan by the date indicated, he/she may submit it by the end of the fifth week of the semester, subject to payment of the fee laid down in the university regulations. If the submission of the work plan is not realized until that date for reasons caused by the PhD student, the semester becomes passive.³

4. Study plan

When creating the study plan, an important aspect was the flexibility of the studies, building on the well-established gradual program of the Faculty of Transportation Engineering and Vehicle Engineering, which was qualified as excellent by the accreditation process of MAB. During the doctoral studies 240 credits have to be accomplished.⁴ From these credits in the Doctoral School maximum 30 credits can be accomplished for teaching activity.⁵ During the doctoral studies maximum 45 credits (in the study and research period) / 60 credits (in the research and dissertation period) can be accomplished per semester, and minimum 15 credits have to be accomplished during every active semesters.⁶ During the doctoral studies the preparation of the dissertation can be rewarded by accomplishing 30 credits.⁷ The research progress reports are building on each other. MSc students may also join the doctoral program and take doctoral subjects.

³ BME TVSZ 177. § (1), (2)

⁴ BME TVSZ 177. § (5)

⁵ BME TVSZ 177. § (4)

⁶ BME TVSZ 177. § (6)

⁷ BME TVSZ 177. § (7)

	Semester									
	1	2	3	4	Complex Exam	5	6	7	8	
Research Methodology	3									
Basic Subjects	4	4	4	4						
Specific Subjects	5	5	5	5						
Teaching Activity	6	6	6	6		4				
Research Progress Report	5	5	5	5		5	5	5	5	5
Research Activity	10	10	10	10						
Publication Activity			5	5		26	20	10		
Thesis preparation							10	10	10	
Sum of credits	33	30	35	35			35	35	25	15

Figure 1. The structure of the study plan

5. Subjects

a) Basic subjects

The aim of the program is to provide a high level of knowledge in the fields of modern mathematics, mechanics, material science, system theory, control theory, informatics, operational research, system optimization, decision preparation and planning theory processes and others.

b) Specific subjects

The aim is to provide a high level of professional knowledge in the fields of theoretical, design, testing, modelling, and experimental and measurement problems of transportation and logistics processes/systems and conducting/supporting tools, taking into account the organic combination of transportation, logistics, engineering (vehicles and mobile machinery) and vehicle sciences. It should be pointed out that the discipline of vehicles and mobile machinery is inherently related to transportation and logistics science and that the narrower technical problems of vehicles and transportation equipment are inseparable from transportation and logistics system problems.

The list of subjects is contained in the document “PhD study plan” of the doctoral program at the Kandó Kálmán Doctoral School.

6. Legal status and reclassification

The rules on the termination of the PhD student’s legal status are contained in the BME TVSZ.⁸ The BME DHSZ contains the rules for reclassification of the scholarship and self-financing students.⁹

⁸ BME TVSZ 186. §

⁹ BME DHSZ 13. § (8)

IV. Professional competences to be acquired

Competences to be acquired by a PhD student at the Kandó Kálmán Doctoral School:

1. Knowledge

- Is familiar in a systematic way with the general rules and interrelations of transportation and vehicle sciences. On research level he/she is familiar with the subject, general and specific characteristics, key directions and boundaries, agreed and disputed interdependencies of his/her scientific field.
- Has solid knowledge about the most important contexts, theories and conceptual systems of the natural science fields related to his field of study, and knows the nomenclature related to them in depth.
- In an understanding and analytical way, he/she continuously expands the international knowledge in his/her scientific field.
- Has the necessary level of computer sciences and mathematical knowledge required to manage, evaluate, and communicate the data and results obtained during his/her research.
- Has the necessary methodological knowledge for conducting independent research on his/her scientific field.
- Interprets and manages in a creative manner the specific mathematical, natural and social science principles, rules, contexts and procedures necessary for the cultivation of the technical field; understands the context, theories of his/her scientific field, and the conceptual systems and professional nomenclature that make them up; interprets the expected directions for the development and progress of the technical field; and the boundaries, requirements and expected directions of development of other fields.

2. Capabilities

- Able to recognize the technical and economical rules of transportation related effects, to analyze these phenomena scientifically and to theoretically interpret them. To expand knowledge of the community with new elements, applies the principles, rules, contexts and procedures of mathematics and natural sciences in an innovative way.
- Able to design and implement new projects on its own in his/her scientific field.
- Capable of creative analysis within his/her scientific field, a synthetic and specific formulation of comprehensive and specific contexts, modeling, evaluation, and critical activity. In research work, he/she is able to organize and direct the work of interdisciplinary research groups.
- Able to apply and further develop specific methods of acquiring knowledge and problem solving in his/her scientific field. Capable of carrying out research in his/her scientific field, solving specific problems that arise, create, and apply new interdisciplinary methods. He/she is able to creatively develop previously unknown ways of applying theoretical questions in practice.
- Recognizes professional problems within his/her scientific field and is able to explore and solve the theoretical and practical background in detail, at the research level.
- Even able to connect professionally distant information and discover the existing relationships between them. In the meantime, able to identify and highlight relevant, decisive, important aspects when assessing the results of research.
- Able to realistically and critically analyze, evaluate, and manage the results of own and other research on a professional basis.

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- Critical about information and news in the transportation and vehicle sciences, and participates in professional discussions with arguments based on expertise.
 - Able to disseminate knowledge on a suitable level to professionals and to the general public, and to participate in professional discussions and debates.
 - Capable of spoken and written professional communication, as well as professional cooperation both domestically and internationally.
 - Able to summarize, present and transfer scientific knowledge and research results. Knows and is able to practice the usual methods of communication in his/her scientific field (e.g. writing papers, books, studies independently).

3. Attitude

- Typical characteristics are creativity, flexibility, problem recognition and solving skills, intuition, methodical and data processing ability, and decision-making behavior.
- Seeks to identify and formulate unresolved scientific questions that have to be explored. Proactive, engaged, and critical of professional, technological development and innovation in the field of technology.
- Characterized by a solid professional commitment, accepting the need for persistent and quality work.
- Open to learning about new technologies, emerging fields of research, disseminating acquired knowledge and incorporating and further developing key elements into his/her own research and development work.
- When solving problems and modeling, shows open thinking free from professional prejudices.
- Characterized by a realistic and empathetic assessment of the professional value of performance, both in terms of his/her own work and the work of those who are managed by them.
- Accepts legitimate professional criticisms and professional arguments of others.
- Committed and open to participation and initiating professional cooperation, both domestically and internationally.
- Constantly strives for an effective balance between individual and group work.
- Characterized by self-contained, in-depth professional work, and also open to teamwork and the support of the work of others.

4. Autonomy and responsibility

- In the field of modern transportation and vehicle sciences has a high degree of autonomy in the development of comprehensive and specific professional issues, representing and justifying professional views. Plays a leading role in solving technical processes and problems.
- Takes conscious responsibility of the global view of transportation and vehicle science. Responsible for answering ethical questions about the theoretical and practical questions of his/her profession.
- As head of research, manages the activities of his/her colleagues with independent decisions and takes responsibility for ensuring their professional development.
- Takes on the role of an equal partner with experts in his/her scientific field.
- All activities are encompassed by responsible thinking based on expertise in protecting and improving the condition of living and inanimate nature.
- Builds new knowledge areas and new practical solutions with creative autonomy.

V. Student progress

1. Work plan

The BME TVSZ defines the rule of preparing the PhD student's work plan.¹⁰ During the studies, the PhD student prepares two work plans.

a) Full work plan

After admission to the Doctoral School, the PhD student creates a four-year work plan for the entire duration of the program. The four-year work plan contains the subjects to be taken during the first four semesters and the research tasks to be carried out every six months. (A template of the four-year work plan is available on the website of the faculty. <https://transportation.bme.hu/phd-programmes/current-students/>)

b) Semester work plan

The PhD student creates a six-month work plan for a given semester of the program. The six-month work plan contains the study, research and publication tasks and plans. (The template of the half-yearly work plan is available on the website of the faculty. <https://transportation.bme.hu/phd-programmes/current-students/>)

The PhD student should send the work plans on paper and electronically to the Dean's Office.

2. Schedule of the research progress reports

The academic performance and the research progress of the PhD students are assessed in every semester by the DIT. The report should contain a summary of the study and research results (including publications, conference and seminar presentations, teaching activity during the doctoral program). The committee evaluates with a mark the report of the PhD student.

	1. sem.	2. sem.	3. sem.	4. sem.	5. sem.	6. sem.	7. sem.	8. sem.
Written	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈
Oral		O ₂		O ₄		O ₆		O ₈

W₁: Written report, in which the PhD student briefly introduces his chosen research topic, justifies the choice of topic, reports on teaching activity, and describes the processed literature.

W₂: Written report, in which the PhD student presents the current situation of the research area based on the processed literature. The main purpose is to identify research problems. The PhD student also reports on teaching activity.

O₂: Oral report, in which the PhD student explains in detail the identified problems of the research area based on the processed literature, explains suggestions and ideas to solve these research problems. The PhD student also reports on teaching activity and educational experience.

¹⁰ BME TVSZ 177. § (1)

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- W₃: Written report, in which the s PhD student defines hypotheses in addition to identifying research problems. The PhD student also reports on teaching activity.
- W₄: Written report, in which the PhD student explains in details the educational experience, draws conclusions and sets goals for the future.
- O₄: Complex exam
- W₅: Written report, in which the PhD student presents the publication activity, in particular plans for papers in IF journals. The PhD student also reports on teaching activity.
- W₆: Written report, in which the PhD student describes the publication activity, in particular how the plans for papers in IF journals have been proceeded. The PhD student reports on teaching activity.
- O₆: Oral report, in which the PhD student provides a detailed description of the publication activity, reports on work and scientific results in the research field. The PhD student reports on compliance with the language exam requirements, which is a condition for submission of the dissertation.
- W₇: Written report, where the PhD student summarizes the experience of the internal defense. Besides that, the main highlight is on the summary of the results of the publication activity, with particular emphasis on the papers in IF journals. In addition the PhD student presents thesis plans for the dissertation.
- W₈: Written report, in which the PhD student presents a detailed description of publication activities and results. Besides that, the thesis points intended to publish or already published are also presented.
- O₈: Oral report, in which the PhD student presents the publication list, the thesis points intended to publish or already published, highlights remarks, and changes based on the suggestions.

The report scheduled for the 8th semester may be substituted by a successful internal defense. The template of the research progress report is available on the website of the faculty. <https://transportation.bme.hu/phd-programmes/current-students/>
The Doctoral School (DI) specifically monitors the elements of academic achievements of the PhD students that are necessary for the initiation of the PhD procedure.

3. Complex exam

At the end of the fourth active semester after the enrollment, the PhD student has to take a complex exam.

The precondition of the complex exam is achieving at least 90 credits in the first four semesters and fulfilling all required „study credits” that are listed in the study plan of the Doctoral School (with the exception of individually preparing PhD students, whose student status is established by applying for and accepting the complex exam).

The complex exam consists of two parts: in one part the theoretical preparedness of the candidate is assessed (“theoretical part”), while in the other part the scientific/artistic progress is presented (“dissertation part”).

In the theoretical part of the complex exam the candidate has to take exam from two subject. The list of subjects is available in the study plan of the Doctoral School on the website of the Doctoral School. In the theoretical part the PhD student demonstrates the awareness of literature in the related scientific/artistic area and current theoretical and methodological knowledge.

In the dissertation part the candidate reports the scientific progress and future plans, including the research plan for the second part of the PhD program, the preparation towards the dissertation and the scheduling of the publication of results. In the presentation the scientific excellence, the innovative aspects, the technological background, and the practical applicability have to be discussed. The candidate has to send a written summary of achieved results and list of publications to the committee at least one week before the exam.

The detailed rules of the complex exam are included in Chapter 9 of the DHSZ and Part 183 of the TVSZ.

4. Research and dissertation phase

A PhD student who has completed the complex exam can continue the studies in the research and dissertation phase of the program. In the research and dissertation phase, the PhD student:

- earns credits for research activities,
- can earn credits for educational activities and,
- forms the doctoral dissertation.

During this phase, the PhD student can perform teaching and educational tasks.¹¹

VI. Tasks in the program

1. Head of Department

- Accepts the topic suggestions of the supervisor and sends them to the Doctoral School attaching the data and competences of the supervisor.
- Approves and signs the full work plans and the semester work plans of the PhD students of the given department.
- Verifies and signs the written semester progress reports of the PhD student of the given department.
- Enables educational activities for PhD students of the given department.

2. Supervisor

- Creates a detailed topic proposal.¹²
- Assists his/her PhD students in preparing their full and semester work plans.
- Manages and continuously monitors the study, teaching, and research work of his/her PhD students.
- Holds consultations to ensure the successful progress of his/her PhD students.
- Evaluates the work of his/her PhD students in their semester progress report.
- Evaluates in details the work of his/her PhD student in the complex exam.
- Can participate in the complex exam.

¹¹ BME TVSZ 184. § (3)

¹² The requirements are included in the Quality Assurance Plan of Kandó Kálmán Doctoral School.

3. PhD student

- Creates a full work plan after the enrollment.
- Creates a semester work plan at the beginning of each semester.
- Creates a six-month written and/or oral semester progress report showing the work carried out in the areas of study, teaching and research.
- Applies for complex exam in Study System.
- At least one week before the complex exam, sends to the committee a brief summary of achievements so far and all the papers submitted for publication or already published in an electronic form.
- May submit applications related to the doctoral program to the Dean of the Faculty in electronic and paper-based format (e.g. passive semester).

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