HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

DOCTORAL SCHOOL OF MECHANICAL ENGINEERING

Head of Doctoral School
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CURRICULUM

GÖDÖLLŐ
2023

GENERAL GUIDELINES

The teaching work of the MTDI is organised and directed by the KÉB on the basis of the University's Study and Examination Regulations.

Students study for four semesters and must complete a total of 120 credits. Deviations from the model curriculum set out in Annex 2 are possible in duly justified cases, subject to prior approval by the KÉB.

Students must enrol and register for courses by 14 October in the autumn semester and by 14 March in the spring semester. In addition to the compulsory subjects, the choice of elective subjects is subject to the approval of the supervisor and the field coordinator.

Students are required to attend the sessions of the curriculum agreed with the supervisor. The coursework must be reported in the form prescribed in the curriculum. Examinations are held in person with the lecturer of the subject.

The autumn semester must be completed by 31 January and the spring semester by 31 August.

The DIT decides on the participation abroad on the recommendation of the supervisor and the KÉB.

The curriculum of the Doctoral School of Mechanical Engineering is set out in Annex 2 and the subjects in Annex 3. The DIT is authorised to change this on the proposal of the Head of the MTDI.

STRUCTURE OF THE TEACHING-RESEARCH PROGRAMME OF THE DOCTORAL SCHOOL OF MECHANICAL ENGINEERING

Out of the 120 credits required during the training period, doctoral students can obtain 40 credits by completing the examination requirements, 8 credits by teaching, and the rest by carrying out research during the training period. The different activities that can be carried out during the training period have been broken down by the MTDI into units as follows. The minimum number of points required can be obtained on this basis.

- **Unit I** means the completion of the required subjects. This includes taking the subjects, participating in their contact hours and completing the examination requirement. In line with national and international practice, MTDI teaches its subjects in English only. If a doctoral student entering the MTDI training system does not already have a C level English language examination, he/she must undertake to take and complete the courses in English.

  - The compulsory courses in the Doctoral School of Mechanical Engineering are those covering the general disciplines of research and engineering. These subjects are compulsory for all MTDI scholars and correspondence students.

- - Elective subjects are research area-specific subjects which, building on the previous "compulsory" subjects, provide answers to theoretical and methodological questions in the fields of research in which MTDI has a special interest.

- **Unit II** refers to the student's teaching activity during the training period, which is a teaching activity at a university or college (classroom or laboratory) related to the doctoral student's research topic. A minimum of two hours per week per semester is expected by the MTDI, for which two credits are awarded (see model curriculum in Annex 2). This is accepted by the MTDI with the joint attestation of the head of department and the supervisor (Form 7), which is then certified by the leader of the KÉB in the Neptun system. If the teaching activity is carried out by the doctoral student at another university or college, the dean/director of the institution and the supervisor must certify that the subject has been completed.
- **Unit III** refers to research work during the training period, consisting of research work assessed as described in Chapter 5.
- **Unit IV** refers to the student's publication activity. The score system for the assessment of publication activity is set out in Annex 4. On the basis of the calculated publication points, the credit points that can be accounted for are three times higher in the training phase and twice in the dissertation phase.

Table 1. summarises the credits required and the credits that must be obtained.

Table 1 Credits associated with study units

Study Unit	MTDI required limits (credits)	
	minimum	maximum
I. Completion of subjects	32	
II. Teaching		8
III. Research work	36	52
IV. Publication	28	52

A doctoral student who does not have the opportunity to carry out teaching activities in an institution of higher education may present his/her work to the students within the framework of the teaching activities of the supervisor's institute, for which he/she may receive teaching credits. Otherwise, the credits earned by completing Unit II may only be exchanged for work in Unit IV. Those who are unable to complete 100% of the research work in Unit III may also replace the points lost by work in Unit IV.

The subject structure and the curriculum of the MTDI as described above are set out in Annex 2. A short five-line description of the subjects taught and the detailed topics of the subjects are available on the Doctoral School's website (mtdi.mate.hu).

Complex exam

The training phase is completed by a two-part complex examination, the successful completion of which is a prerequisite for progression to the "Research and Dissertation phase".

The precondition of the complex exam, that the candidate must have a basic level knowledge of a second foreign language, justified by a certificate or by an oral presentation during the

exam. If the state language examination at intermediate level type C attested at the time of admission is not in English, the second language has to be in English.

The publication requirement for admission to the complex examination is at least two accepted publications in the field of the research, one of which preferable must have been published in either WoS or Scopus (min. Q2).

For the theoretical part of the complex examination, two subjects (topics) relevant to the research topic will be defined by the DIT at the time of admission, on the basis of a proposal from the field coordinator.

In the dissertation part of the complex examination, the candidate will give a presentation of his/her knowledge of the literature, report on his/her research results, outline his/her research plan for the second stage of doctoral studies and the timetable for the preparation of the dissertation and the publication of the results.

The examination board will mark the theoretical and dissertation parts of the examination separately. A report of the complex examination, including a written evaluation, will be drawn up. The results of the examination shall be announced on the day of the oral examination. The complex examination shall be passed if a majority of the members of the examination board pass both parts of the examination. If the theoretical part of the examination is unsuccessful, the candidate may retake the examination in the subject(s) not passed on one further occasion during the examination period. The dissertation part of the examination may not be repeated in the event of failure.

The absolutorium

A prerequisite for the award of the diploma is the acquisition of all the required credits.

Research management tasks of the Doctoral School of Mechanical Engineering

Supervision of the doctoral researcher's work

In general, the DI contributes to the successful development of the research topic as follows:

- providing professional support on specific methodological issues of the research,
- support the publication and presentation of research results at conferences,
- assist in the organisation of study abroad opportunities, taking into account the topic and the language skills of the doctoral student.
- To monitor, evaluate and support the progress of the doctoral studies, it organises regular, compulsory oral reports (PC-progress control) according to a semester timetable (Table 2), which is compulsory for both full-time and correspondence students. The assessment of the reports is as follows:
  - PC 1 and PC 3 for the assessment of the "Progress Control": 3-4 credits/PC (Unit III)
  - PC 2 – Literature processing: 10-18 credits (Unit III).
  - PC 4 – Research report 10-14 credits (Unit III)
  - PC 5 - PC 8 – Research progress report 8-10 credits/PC

Table 2. Schedule of mandatory oral reports (PC)

Date		Number	Content	Evaluation
Training and research phase	Semester I, December	PC 1	Research work plan, literature processing	Field coordinators, supervisor and KEB (acceptable / to be improved / 3-4 credits)
	Semester II, March	PC 2	Literature review, critical appraisal, research tasks, publication plans	Field coordinators, supervisor and KEB (scoring 10 - 18 credits / to be corrected)
	Semester II, June	PC 3	Research progress, publications	Field coordinators, supervisor and KEB (progress scoring, suggestions, guidance / 3-4 credits)
	Semester III, December-January	PC 4	Progress in research, publications, Defence of "Research report"	Field coordinators, supervisor and KEB (evaluation, proposals, guidance / 10-14 credits)
	Semester IV, June	first final research report		
		complex exam		
Research and dissertation phase	Semester V, December	PC 5	Detailed presentation of research results, expected theses	Field coordinators, supervisor and KEB (progress scoring, suggestions, guidance / 8-10 credits)
	Semester VI, June	PC 6	Detailed presentation of research results, expected theses and their publication	Field coordinators, supervisor and KEB (progress scoring, suggestions, guidance / 8-10 credits)
	Semester VII, December	PC 7	Outline of the thesis, overview presentation: literature, methodology, results, expected theses, publication results	Field coordinators, supervisor and KEB (progress scoring, suggestions, guidance / 8-10 credits)
	Semester VIII, June	PC 8	summary presentation, theses, publications (pilot defence)	Field coordinators, supervisor and KEB, invited guests, (referees) / 8-10 credits

It is the responsibility of the supervisor to provide concrete support for the research work. The MTDI will support the research work through ongoing debriefing and reporting.

Accordingly, doctoral students are expected to complete the following tasks:

- By the end of October of the first academic year, submit the **Work Plan** signed by the supervisor in accordance with Form 4. The submitted work plan will be handed over by the field coordinator to a reviewer (3 weeks deadline for review), whose review will be taken into account when the doctoral student presents and defends his/her research work plan at the 1st PC (progress control) lecture for students in December. The field coordinators and experts (evaluation committee) present will grade it (acceptable or to be corrected). In case of correction, the student will return the revised work plan to the field coordinator in January. The research work plans proposed for approval by the field coordinators are presented at the DIT meeting by the coordinators in February and approved by the DIT.
- By 28 February of the first academic year, the doctoral student must submit a written **Literature review** (see Form 8), which the doctoral student will present in March in the PC 2 lecture. Based on the submitted written material and the oral presentation, the paper will be graded by the evaluation committee present. This may be done by returning the paper for correction or by awarding 10-18 credits depending on the merit of the work. In case of correction, the updated literature review must be returned to the field coordinator within three weeks. The literature review should include a critical analysis of the publications related to the topic, identifying areas of disagreement or unclear issues as described in Form 8.
- Thereafter, after submission of the literature review, the doctoral student is required to report (Table 2, PCs) at least once every six months to the supervisor, the field coordinators and invited experts on the ongoing progress of the research. A report is a professional, substantive summary ppt presentation of approximately 15 minutes, followed by 10-15 minutes of discussion, guidance and evaluation. Lost credits may be compensated with publication points. If no substantive progress is detected at the next presentation, the field coordinator and the KEB will investigate the reason for the possible impediment and take the necessary measures.
- By 15 December of the second academic year, the doctoral student must submit a written and consolidated **Research Report** (see Form 9), including a list of publications on the topic. The research report must be presented and defended in an oral presentation at the 4th PC in January, announced for the third semester. The evaluation committee present (field coordinators, KEB, invited experts) will evaluate and give marks for the submitted paper (already reviewed by the coordinator or his/her invited referee), the presentation and the peer discussion. If the doctoral student does not obtain at least 10 of the available 14 credits, he/she must submit a new report in due time and defend it again. If at least 10 but less than 14 credits are obtained, the lost credits may be made up by publications for the award of the absolutorium. Students who do not submit their research report on time may make up the research report in the following year at the latest.

Publication practices of the Doctoral School of Mechanical Engineering

The doctoral student's publication activity is evaluated as follows.

A publication is considered to be of scientific merit if it is published in a professional/scientific journal covering the research areas of the Doctoral School or in another authoritative journal

(with an editorial board and an English abstract) and if it can be shown to contain a substantial original result(s) in the field of the given discipline.

The DIT does not accept a publication in a daily or weekly journal as a communication of scientific value, but it has a place in the list of literary activities - other category, as it also refers to the professional public activity and habitus of the author.

Accountability system of the Doctoral School

Training
(Maximum number of credits available: 40)

- In order to meet the training requirements, the courses taken (32 credits) must be completed by 31 January or 31 August, depending on the semester. Anyone who fails to complete a course that has been enrolled in will be cancelled and will be able to repeat it.
- The teaching activity (4 x 2 = 8 credits) must also be certified by 1 March or 1 September. The certificate is issued by the head of the department in-house or by the director general (dean) at an external institution. The teaching activity is registered in Neptun by the leader of KÉB. Those who do not complete the teaching activity or do not provide a certificate can only make up the missing credits by publications.

Research
(Maximum score: 52 credits)
Abstracts and summaries (literature review, research report) must be completed within the prescribed time.

a. Workplan (3-4 credits)
- • the qualification is given by the final evaluation of the 1st PC (December, 1st semester), before which the subject coordinator evaluates the submitted material separately for the committee;
- the grading committee may return the work for correction if it is less than 3 credits;
- lost credits may be made up by additional publications.

b. Literature review (18 credits, minimum 10 credits to be achieved)
- The grade will be determined by the final evaluation of the PC 2 (March, 2nd semester), prior to which the field coordinator will evaluate the submitted material separately for the committee;
- the grading committee may return the work for correction if it is less than 10 credits;
- lost credits may be made up by additional publications.

c. Progress Control (PC 3) (3-4 credits)
- the qualification is given by the final evaluation of the 3rd PC (June 2nd semester);
- the grading committee may return the work for correction if it is less than 3 credits;
- the credits lost may be made up by additional publications.

d. Research report (PC 4) (10- 14 credits, minimum 10 credits to be achieved)
- to be graded by a committee set up for this purpose (December – January, 3rd semester);
- the credits lost may be made up by additional publications.

e. 1st Final Research report (10-12 credits, minimum 10 credits to be achieved)

- to be graded by a committee set up for this purpose (June, 4th semester, at least 2 weeks earlier as the complex exam);
- the credits lost may be made up by additional publications.

c.Research activity in the dissertation phase

- In the dissertation phase, 15 credits per semester may be awarded for research activity. 5 credits may be awarded by the supervisor, 8-10 credits may be awarded on the basis of the evaluation of the PC reports.

Publications

- students who do not complete the publication activity in the required semester may make up the publication activity until the end of the training research phase;
- the number of publication credits in the training phase is three times the number of publication points, with a minimum of 28 and a maximum of 50 credits;
- in the dissertation phase, the number of publication credits is twice the number of publication scores, of which an average of 15 credits per semester;
- the grade is submitted by the field coordinator to the DIT for decision;
- the candidate must have at least three national and two foreign peer-reviewed journal articles (at least 2 out of 5 must be impact factor or Q1 or Q2 rated journals) within the minimum publication score - *the impact factor is checked by the Web of Science JCR database (https://jcr.clarivate.com) while the qualification Q1 or Q2 by the Scopus SJR database (https://www.scimagojr.com).*

Curriculum - Doctoral School of Mechanical Engineering					
I. year	**1. semester**		**I. year**	**2. semester**	
subject	**hour sem**	**credit**	**subject**	**hour sem**	**credit**
Planning of experiments	30	4	Theory and practice of engineering research	30	4
General Research Methodology	30	4	Measurement technology	30	4
Modelling and simulation	30	4	Researcher's Ethic	30	4
Education	30	2	Literature review (PC 2)	-	10-18
PC 1 (Workplan)		3-4	Education	30	2
			Progress Control (PC 3)		3-4
Total credits:		**18**	Total credits:		**36**
II. year	**3. semester**		**II. year**	**4. semester**	
subject	**hour sem**	**credit**	**subject**	**hour sem**	**credit**
Elective subject	30	4	1st Final Researh report	-	10-12
Elective subject	30	4	Education	30	2
Education	30	2	Publication		8
Publication	-	20			
Research report (PC 4)		10-14			
Total credits:		**44**	Total credits:		**22**

Subjects:	32
Education:	8
Research:	52
Publication:	28
Total credits during the first two years:	**120**

III. year	**5. semester**	**III. year**	**6. semester**
Research	5	Research	5
Progress Control (PC 5)	8-10	Progress Control (PC 7)	8-10
Publication	15	Publication	15
Total	30	Total	30

IV. year	**7. semester**	**IV. year**	**8. semester**
Research	5	Research	5
Progress Control (PC 6)	8-10	Progress Control (PC 8, 2nd final reserach report)	8-10
Publication	15	Publication	25
Total	30	Total	30

Total credits during the dissertation part (second 2 years):	**120**
Total credits	**240**

Doctoral School of Mechanical Engineering Subjects of the Doctoral School	
subject	Lecturer
Compulsory subjects (4 credits)	
Modelling and simulation	István Farkas, DSc professor
General Research Methodology	Gábor Kalácska, DSc professor
Theory and practice of engineering research	Rita Kiss DSc professor
Planning of experiments	István Oldal , PhD associate professor
Measurement technology	István Seres, PhD associate professor
Researcher's Ethic	István Szabó, PhD professor
Elective subjects (4 credits)	
Heat and mass transfer	János Beke, DSc prof emeritus
Environmental Techniques	Gábor Géczi , PhD, associate professor
Mechatronical systems	László Jánosi, CSc prof. emeritus
Material Science	Gábor Kalácska, DSc professor
Mechanical analysis of machinery	László Kátai, PhD associate professor
Classical mechanics	István Keppler, PhD professor
Terrain vehicle dynamics	Péter Kiss, PhD professor
Electricity management	Péter Sembery, CSc professor emeritus
Differential equations	László Székely, PhD associate professor
Wind and geothermal energy utilizaion	László Tóth, DSc prof. emeritus