



Program: MAE
Degree Level: Doctor of Engineering

Faculty/College: TGGS

5. Semester/ year of study

Semester 1 (Aug. to Dec.) Semester 2 (Jan. to May) Academic Year: 2023

6. Pre-requisite (if any)

No Yes, please provide:

7. Co-requisites (if any)

No Yes, please provide:

8. Venue of study

Dissertation Research Center Industry
 RWTH Aachen University MoU Partner University

9. Information for quality assurance in education

This course shows evidence of:

- Development of implementation from previous practices, e.g. the improvement of class teaching, course content, content classification and methods used for learning assessment
- Involvement from professional bodies/ external agencies in instruction; thus Enhancing student academic and professional experiences
- Integration of research or creative activities with instruction; use of research-based learning management; knowledge management practices for learning improvement
- Integration of academic services and course implementation
- Combination of cultural heritage preservation efforts into instruction or student activities

10. Date of latest revision

June 2023

Section 2: Course Description and Implementation

1. Course Description *(As written in the Official Approved Curriculum)*

Research procedure in interesting topics both in fundamental knowledge and industrial aspects with analytical and research problem solving processes to gain fundamental knowledge and/or to originally improve related processes with significant development or with significant impact. The doctoral dissertation is based on referencing related fundamentals and theories, defining the research purpose, scoping the work, literature review, model development, experimental plan and procedures, analysis of data and results, discussion of the results, drawing conclusions and outlook for further research. The doctoral candidate has to pass the qualifying exam, the dissertation proposal, the progress exam, and finally the defense exam. The output of the doctoral dissertation must be delivered as research articles in international journals as well as dissertation.



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2. Number of hours per semester

Lecture	Practice	Self-study
	720 hours/ 18 weeks (40 hours/week*)	30 hours/ semester (5 hours/3 weeks*)

Remark: * Based on at least 18 weeks

Course Category: Lecture Practice Laboratory
Course Evaluation: A-F S/U P

3. Number of hours per week for academic guidance to individual students

- 1. Giving academic advice (minimally number hour per week) during the office hour
 1 2 3 4 5 depending on Advisor
- 2. Adopting information technology-based academic advising
 Email Phone Communication Apps Meeting Online:
 Other (specify) depending on Advisor
- 3.

4. Course Learning Outcomes (CLOs): Students should be able to:

- CLO 1 To advance fundamental knowledge and/or to originally improve technical systems or technologies in the field with significant development.
- CLO 2 To thoroughly survey and review high-quality research articles in the open literature.
- CLO 3 To define the research objectives and scope.
- CLO 4 To proceed the research work with well-defined plan.
- CLO 5 To analyze or evaluate the data/results and draw the conclusion together with suggestions for future work.
- CLO 6 To write the research articles accepted at the level of peer-reviewed international journals and doctoral dissertation.

5. The mapping between the curriculum’s Expected Learning Outcomes (ELOs) and Course Learning Outcomes (CLOs) (Table 5.1: for subject-specific courses designed for a specific curriculum; Table 5.2 is purposed for courses designed for various curriculums)



Table 5.1 ELOs-CLOs Consistency (for a subject-specific course/ a specific curriculum)

ELOs/CLOs consistency	CLO	CLO	CLO	CLO	CLO	CLO
	1	2	3	4	5	6
SLO1 - Students have knowledge and understanding of principles, techniques and methodology	✓					
SLO2 - Students gain knowledge and understanding of principles, techniques and methodology by conducting a literature review on a given topic independently based on relevant reference sources		✓				
SLO3 - Students conduct a literature review on a given topic independently based on relevant reference sources in order to extend and integrate knowledge by applying principles, techniques and methodology to tackle practical engineering problems, according to ethics of mechanical engineer societies and/or engineering safety laws and regulations		✓	✓			
SLO4 - Students extend and integrate knowledge by applying principles, techniques and methodology to tackle practical engineering problems, according to ethics of mechanical engineer societies and/or engineering safety laws and regulations; as team leaders and also project coordinators, either applying CAD/CAE commercial software to design and simulate the behaviors of mechanical systems and vehicles or designing, constructing and setting up experiments to investigate the behaviors of mechanical systems and vehicles				✓	✓	
SLO5 - Students as team leaders and also project coordinators either apply CAD/CAE commercial software to design and simulate the behaviors of mechanical systems and vehicles or design, construct and set up experiments to investigate the behaviors of mechanical systems and vehicles and finally extract and sum up the key information in writing for publications in reputable journals					✓	✓

Remark: Since there are no courses in the MAE Doctoral program, ELOs are specified by Stage LOs (SLOs) instead.



Table 5.2 Mapping of desirable characteristics of KMUTNB graduates and CLOs (for non-specific courses, designed for various curriculums)

Consistency between desirable characteristics of KMUTNB Graduates- CLOs	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	CLO 6
1. Professional credentials with critical thinking skills						
2. Integrity and social responsibility						
3. Innovative and technopreneur mindset						
4. Global Competence						

Section 3: Student Improvement in relation to Course Learning Outcomes (CLOs)

Organizing learning experiences to develop skills/knowledge; assessment of CLOs in accordance with the ones identified in Section 2.4

Course Learning Outcomes (CLOs)	Teaching Methods compliant with CLOs	Evaluation Methods compliant with CLOs
CLO 1	Project-based learning Project presentation/report	Research group discussion/Report evaluation
CLO 2	Literature survey and review Project presentation/report	Research group discussion/Report evaluation/Qualifying exam
CLO 3	Project-based learning Project presentation/report	Research group discussion/Report evaluation/Dissertation proposal
CLO 4	Project plan and management Project presentation/report	Research group discussion/Report evaluation/Dissertation proposal/Progress exam
CLO 5	Project-based learning Project presentation/report	Research group discussion/Report evaluation/Progress exam
CLO 6	Project presentation/report/articles/dissertation	Research group discussion/Report evaluation/Peer review/Dissertation defense exam



Example:

Course Learning Outcomes (CLOs)	Teaching Methods compliant with CLOs	Evaluation Methods compliant with CLOs
<i>CLO1</i>	<i>Lecture, case studies, assignment</i>	<i>- Midterm exams Assignment evaluation</i>
<i>CLO2</i>	<i>Case studies, project-based learning</i>	<i>- Evaluation of presentations and group projects Assessment of assigned exercises</i>
<i>CLO3</i>	<i>Case studies, group discussions, project-based learning</i>	<i>- Presentation and group project assessment; teacher observation, idea sharing Alternative peer evaluation</i>
<i>CLO4</i>	<i>Group discussion, project presentation</i>	<i>- Peer evaluation of in-group project Teacher observation</i>

Section 4: Learning Activities

1. Student activities

All students must register and perform the doctoral dissertation for at least 6 semesters with maximum of 12 semesters.

The student will be integrated into the advisor's research group in which the student will have regular meetings with the advisor and his/her research group to discuss about the progress and obstacle of the research work. While doing research, the student will seek for assistance/guidance from colleagues in the research group with Doctoral students, Research Assistants and/or Engineers, or colleagues in other research groups. Moreover, the student will participate in the research group's orientation, lab tour and safety training during the first semester of the first academic year. This will strengthen the relationship among the co-researchers.

The list of specific qualifying activities depends on the field of study but the standard activities are listed as follows:

- Literature Review
- Qualifying Examination
- Proposal Examination
- Start with Research Work and Preparation of Doctoral Dissertation: Methodology, Results and Discussion, Conclusions, Suggestions/Recommendations for Future Work.
- Progress Examination



- Continuation of Research Work and Preparation of Doctoral Dissertation: Methodology, Results and Discussion, Conclusions, Suggestions/Recommendations for Future Work
- Defense Examination and Dissertation Submission

Since the student will be treated as one of advisor's researchers, the student must follow his/her rules and regulations along with the TGGS rules and regulations. In addition, the student must consider the morality, confidentiality and engineering ethics in every step in doing research. The advisor will regularly give advice or guidance to the student and discuss every aspect of the dissertation.

2. Reports or assignments

Reports or assignments	Deadline/Sequence
Literature Review	Prior to the Qualifying Examination.
Qualifying Examination	By the end of the third semester.
Proposal Examination	After passing the Qualifying Examination.
Progress Examination	After the proposal is approved.
Defense Examination	After passing the Progress Examination.
Dissertation Submission	After passing the Defense Examination.

Remark: Number of meetings and deadlines can be redesigned to suit the company working style.

3. Monitoring student learning outcome in research work

The advisor will regularly meet the student to discuss about the progress and obstacle of the research work, update literature review from texts, research journals and other publications, and evaluate the student's performance; critically and systematically thinking skills; interpersonal and professional working relationship and working atmosphere; and analytical, communications and IT skills, from the following items:

- The student's weekly/monthly report
- The student's qualifying, proposal and progress examinations
- The student's dissertation

Moreover, the student will be evaluated during the TGGS Qualifying, Proposal, Progress and Defense Examinations by the committee. The committee will provide the comments on the TGGS Evaluation Form and finally provide the decision on the Dissertation Defense Examination Evaluation Form.

4. Duties and responsibilities of a workplace mentor for the research work

Only relevant for research with the industry. The supervisor/mentor regularly meets student to assist or give guidance during the office hour and the regular research group meeting. In each meeting, the supervisor/mentor will evaluate the performance of the student in each listed aspect



and the student will be informed in order to improve those aspects. Moreover, the student will be evaluated during the TGGs Qualifying, Proposal, Progress and Defense Examinations by the committee. The committee will provide the comments on the TGGs Evaluation Form and finally provide the decision on the Dissertation Defense Examination Evaluation Form.

5. Duties and responsibilities of the advisor / faculty supervisor

The advisor regularly meets student to assist or give guidance according to the teaching methodology listed in Item 3 Learning Outcome Development during the office hour and the regular research group meeting. In each meeting, the advisor will evaluate the performance of the student in each listed aspect and the student will be informed in order to improve those aspects. Moreover, the student will be evaluated during the TGGs Qualifying, Proposal, Progress and Defense Examinations by the committee. The committee will provide the comments on the TGGs Evaluation Form and finally provide the decision on the Dissertation Defense Examination Evaluation Form.

6. Preparation in guiding and assisting the students

- 6.1 Orientation Day (During the first semester of the first academic year):
 - The TGGs Dissertation Guidelines and Procedures will be provided to students.
 - Lab Tour and Safety Training
- 6.2 Regular Research Progress Meeting (depending on each research group):
 - Students doing research give the presentation of their work to their belonged research group.

7. Facilities and support required by the workplace

The MAE program currently has 9 laboratories: (1) Solid Mechanics Lab, (2) CFD Research Lab, (3) Structural Dynamics Lab, (4) Design and Innovation Lab, (5) Automotive Virtual Safety Simulation Laboratory, (6) Automotive Test Track, (7) Automotive Component Impact Test Laboratory, (8) Full Vehicle Crash Test Laboratory, and (9) Automotive Brake Performance Test Area. Inside the Solid Mechanics Lab, there are 4 sub-areas for the following 4 laboratories: (1.1) Strength of Material Lab, (1.2) Material Processing and Characterization Lab, (1.3) Material Treatment Lab, and (1.4) Contact Mechanics and Surface Engineering Lab.

Section 5: Planning and Preparation

1. Work place identification

Based on each research group.

2. Student preparation

To review and gain understanding of the objectives of the research work and prepare the student for the research work, the orientation will be held as soon as the student is integrated into



the research group. In order to have a successful dissertation, the student must have the following skills:

- 2.1 Research skill
- 2.2 Experimental skill including in the laboratory and simulations
- 2.3 Problem solving skill
- 2.4 Presentation skill
- 2.5 Writing skill for the technical report, article and dissertation
- 2.6 Social skill

3. Advisor/ supervisor preparation

The curriculum chairman/program coordinator will assign the lecturer to be the advisor for his/her research topic. The advisor must be familiar with the TGGS Dissertation Guidelines and Procedures and following the procedures and regulations very closely. In addition, the advisor must regularly meet the student to assist or give guidance.

4. Preparation of mentor at work place

Only relevant for research with the industry. Since the supervisor/mentor are already familiar with the industrial research; he/she only needs to understand the TGGS Dissertation Guidelines and Procedures and following the procedures and regulations very closely. In addition, the supervisor/mentor must regularly meet the student to assist or give guidance.

5. Risk management

The student will make the appointment with the advisor and have discussion on the research background, objective, and scope.

- 5.1 The student will be supervised by the advisor and/or the supervisor/mentor that are familiar with the research topic.
- 5.2 The advisor and the supervisor/mentor will carefully plan the research tasks for the student.
- 5.3 The student will receive the orientation, lab tour and safety training from the advisor's research group prior starting the research work.
- 5.4 The student will participate in the Regular Research Progress Meeting to exchange the ideas and discuss about the project.
- 5.5 The advisor and supervisor/mentor regularly meet the student to assist or give guidance.

Section 6: Student Evaluation

1. Evaluation criteria

According to the Regulations for Examination in the Doctor of Engineering Programs (RED) of The Sirindhorn International Thai-German Graduate School of Engineering (TGGS)



2. Evaluation process

For TGGs Qualifying, Proposal, Progress and Defense Examinations, the evaluation procedure is according to the Regulations for Examination in the Doctor of Engineering Programs (RED) of The Sirindhorn International Thai-German Graduate School of Engineering (TGGs).

3. Responsibilities of monitoring and student evaluation by the mentor

Only relevant for research with the industry. The supervisor/mentor regularly meets the student to assist or give guidance during the office hour and the regular research group meeting. In each meeting, the supervisor/mentor will evaluate the performance of student in each listed aspect and the student will be informed in order to improve those aspects. Moreover, the student will be evaluated during the TGGs Qualifying, Proposal, Progress and Defense Examinations by the committee. The committee will provide the comments on the TGGs Evaluation Form and finally provide the decision on the Dissertation Defense Examination Evaluation Form.

4. Responsibilities of evaluation by the faculty in charge

The advisor regularly meets student to assist or give guidance during the office hour and the regular research group meeting. In each meeting, the advisor will evaluate the performance of the student in each listed aspect and the student will be informed in order to improve those aspects. Moreover, the student will be evaluated during the TGGs Qualifying, Proposal Progress and Defense Examinations by the committee. The committee will provide the comments on the TGGs Evaluation Form and finally provide the decision on the Dissertation Defense Examination Evaluation Form.

5. Conclusion of assessment discrepancies

The evaluation results will be discussed during the meeting and students will be informed in order to improve those aspects. Since the comment is assigned for each evaluation, the advisor and the committee can observe the improvement of the student's performance.

Section 7: Evaluation and Improvement of Research Work

1. Evaluation process conducted by:

1.1 Student

The student will evaluate the Dissertation course using the TGGs Course Evaluation form.

1.2 Supervisor at work place

Only relevant for research with the industry. The supervisors/mentors will evaluate the student using the TGGs Qualifying, Proposal, Progress and Defense Examination Evaluation Forms in which they can provide additional comment.

1.3 Advisor/ teacher in charge

The advisor will evaluate the student using the TGGs Qualifying, Proposal, Progress and Defense Examination Evaluation Forms in which they can provide additional comment.



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1.4 Others

None

2. Review of evaluation procedures and improvement planning

None



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**Instruction for OBE 4 Preparation
Section 1: General Information**

Topic	Description
1. Course code/ title	XXXXXXXXXX Course title (Thai and English)
2. Number of credits	Credits (Lecture/Practice/Self-study Hours)
3. Course category	Specify the program of study and course classification e.g. general core courses for several disciplines, required, major, electives, specific elective categories
5. Semester / year of study	Specify semester/ year of study consistent with the curriculum
8. Information for quality assurance in education	Put check marks in the appropriate boxes

Section 2: Course Description and Implementation

Topic	Description
1. Course description	As defined in Program Specification (OBE2)
2. Time length per week	Indicate lecture hours – lab/practice hours – self study hours
3. Time length per week for individual academic consulting	Identify time and modes of consultation outside classroom, e.g. <i>consulting via mobile phone, e-mail, social media</i>
4. Course Learning Outcomes: CLOs	Complete the form (●) in accordance with the statements of responsibilities in OBE2 (program specification) and fill out the Table indicating the ELOs-CLOs Consistency
5. Expected Learning Outcomes of the study program(ELOs)	Define ELOs as specified in OBE2, section 4 (Table 5.1 -Specific course for a particular program; Table 5.2- Course for multiple programs) Put check marks to the ones that apply.

Section 3: Student Improvement in relation to Course Learning Outcomes (CLOs)

Topic	Description
Teaching methods, learning experience and assessment in line with CLOs	See statements in OBE2 (Program specification) section 4. ELOs can be applied to determine course implementation and learning outcomes assessment on the basis of CLOs.