Program Specifications of
Master of Engineering in Electrical and Computer Engineering
(revised April 2021)

Degree awarding Institute King Mongkut's University of Technology North Bangkok

Facutly The Sirindhorn International Thai-German Graduate School of Engineering (TGGS)

1. Curriculum name

Thai: วิศวกรรมศาสตรมหาบัณฑิต สาขาวิชาวิศวกรรมไฟฟ้าและคอมพิวเตอร์ (หลักสูตรนานาชาติ)

English Master of Engineering in Electrical and Computer Engineering (International Program)

2. Degree title

Full (Thai): วิศวกรรมศาสตรมหาบัณฑิต (วิศวกรรมไฟฟ้าและคอมพิวเตอร์)

Abbr. (Thai): วศ.ม. (วิศวกรรมไฟฟ้าและคอมพิวเตอร์)

Full (English): Master of Engineering (Electrical and Computer Engineering)

Abbr. (English): M.Eng. (Electrical and Computer Engineering)

3. Program credits

46 Thai CHE credits equivalent to 120 ECTS credits

4. Program details

4.1	Number of semesters in one academic year	2 semesters
4.2	Number of weeks per semester	16-18 week
4.3	Regular study period	2 years
4.4	Maximum allowable study period	5 years
4.5	Language used in program	English

4.6 Tuition fees

Thai student 60,000 THB per semester (for 4 semesters)

60,000 THB per semester x 4 semesters = 240,000THB for two-year study period

International student 85,000 THB per semester (for 4 semesters)

85,000 THB per semester x 4 semesters = 340,000THB for two-year study period

For further prolonged study from the 5th semester, only registration fees for maintaining the student status of 10,000THB is charged. (after two years but not more than five years)

5. Programme structure

5.1 Study Plan A Type A1

Master of Engineering in Electrical and Computer Engineering Plan A Type A1			
Semester	**Required Course**	**Elective Course**	**Credits**
1.	**Master Thesis** (8 credits) **Seminar in ECE** (3 credits)	-	**11 credits** (30 ECTS credits)
2.	**Master Thesis** (8 credits) **Industrial Research Methodology** (3 credits)	-	**11 credits** (30 ECTS credits)
3.	**Master Thesis** (12 credits)	-	**12 credits** (30 ECTS credits)
4.	**Master Thesis** (12 credits)	-	**12 credits** (30 ECTS credits)
		Total	**46 credits** (120 ECTS credits)

Course outlines

	Thai credit	ECTS credit
Total required credit	**46**	**120**
Taught course	**6**	**12**
General core course	6	12
Master thesis	**40**	**108**

Remark

General core courses are mandatory for all students.

5.2 Study Plan A Type A2

Master of Engineering in Electrical and Computer Engineering Plan A Type A2			
Semester	**Required Course**	**Elective Course**	**Credits**
1.	Seminar in ECE (3 credits)	4 courses (12 credits)	15 credits (30 ECTS credits)
2.	Industrial Research Methodology (3 credits)	4 courses (12 credits)	15 credits (30 ECTS credits)
3.	Industrial Internship (at least 16 weeks, 4 credits)	-	4 credits (30 ECTS credits)
4.	Master Thesis (12 credits)	-	12 credits (30 ECTS credits)
		Total	46 credits (120 ECTS credits)

Course outlines

	Thai credit	ECTS credit
Total required credit	46	120
Taught course	30	60
General core course	6	12
Elective course	24	48
Industrial internship	4	30
Master thesis	12	30

Remark

General core courses are mandatory for all students.

Elective courses can be chosen from the list of all elective courses.

5.3 Study Plan B

Master of Engineering in Electrical and Computer Engineering Plan B			
Semester	**Required Course**	**Elective Course**	**Credits**
1.	Seminar in ECE (3 credits)	4 courses (12 credits)	15 credits (30 ECTS credits)
2.	Industrial Research Methodology (3 credits)	4 courses (12 credits)	15 credits (30 ECTS credits)
3.	Industrial Internship (at least 16 weeks, 4 credits)	-	4 credits (30 ECTS credits)
4.	Master Project (6 credits)	2 courses (6 credits)	12 credits (30 ECTS credits)
		Total	46 credits (120 ECTS credits)

Course outlines

	Thai credit	ECTS credit
Total required credit	46	120
Taught course	36	72
General core course	6	12
Elective course	30	60
Industrial internship	4	30
Master project	6	18

Remark

General core courses are mandatory for all students.

Elective courses can be chosen from the list of all elective courses.

List of Electives Courses

Course	Lecture hours	Assignment and self-study	Preparation for exam	Total working hours per semester	ECTS credits	KMUTNB Credits	Code
Information Theory and Source Coding	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245121
DSP Design Methodologies and Tools	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245125

Course	Lecture hours	Assignment and self-study	Preparation for exam	Total working hours per semester	ECTS credits	KMUTNB Credits	Code
Multimedia Communications	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245126
VLSI Architecture	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245127
Algorithm Design of Digital Receivers	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245128
Cryptography	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245129
System and Processor Architectures for Mobile Devices	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245130
Estimation and Detection Theory	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245131
Special Problems in Communication Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245132
Software-Defined Radio and Cognitive Radio Network	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245133
Advanced Topics in Communications	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245134
Electromagnetic Field Theory for Smart Sensing Applications	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245135
Microwave Components and Circuit Design	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245136
Communication Protocols	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245137
Broadband Wireless Communication Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245138
Introduction to Radar Technology	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245139
Power System Reliability	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245222
Electrical Transients in Electrical Power Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245223
Battery Storage Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245224
Electric Vehicles	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245226
Selected Topics in Electrical Power Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245227
Asset Management of Electrical Power System	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245229
Power System Monitoring, Control and Protection	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245230
Distributed Generation Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245231
Renewable Energies for Electrical Power Generation	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245233
Electric Drive System	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245234

Course	Lecture hours	Assignment and self-study	Preparation for exam	Total working hours per semester	ECTS credits	KMUTNB Credits	Code
Testing and Condition Diagnostic of High Voltage Equipment	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245235
Electric Power Generation Control and Protection	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245236
Computer Graphics	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245322
Selected Topics in Practical Computer Science	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245323
Network Security	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245331
Machine Vision	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245332
Digital Image Processing	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245334
Embedded Software	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245336
Machine Learning	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245337
High Performance Computing using Graphics Processing Units	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245338
Advanced Computer Architecture	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245339
Principles of Data Mining	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245340
Information Retrieval	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245341
Algorithmic Differentiation	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245342
Parallel Computing	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245343
High Performance Scientific Computing	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245344
Human-Computer Interaction	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245346
Optimization	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245348
Applications of Digital Image Processing	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245349
Efficient Algorithm	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245350
Hardware and System Software Architectures	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245351
Advanced Software Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245352
Database Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245353
Advanced Database Management Systems	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245354
Cloud Computing)	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245355
Storage System	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245356
Compiler Design and Optimization	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245357
Bioinformatics	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245358
Advanced Operating System and Distributed System	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245359

Course	Lecture hours	Assignment and self-study	Preparation for exam	Total working hours per semester	ECTS credits	KMUTNB Credits	Code
Selected Topics in Computer Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245360
Advanced Topics in Computer Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245361
Communication Systems for Smart Grids	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245423
Internet of Things	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245424
Cyber Security for Smart Grids	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245425
Advanced Topics in Smart Grid Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245426
Special Problems in Smart Grid Engineering	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245427
Data Management and Analysis	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245428
Modern Power Grid Operation and Control	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245429
Advanced Wireless Communications and Metering Infrastructure	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245430
Design Methodology	3h x 15w	5h x 15w	30	150	6	3(3-0-6)	090245431

6. Admission

6.1 Admission requirement

- Bachelor degree in engineering or science in relevant fields of Electrical and Computer Engineering
- Good english proficiency (check the announcement by the academic affairs on https://tggs.kmutnb.ac.th/admission/apply-now/ for more information)

6.2 Application documents

The fundamental applications documents are in the following,

1. Completion of application form
2. Evidence of qualifications (certificates or transcripts)
3. Evidence of English Language Proficiency test
4. Two Letters of Recommendations in sealed envelopes

5. Curriculum Vitae (CV) or Resume
6. A copy of your identification card or passport
7. Finanical statement (only for international student with self-support)

Note that the requirement of application documents is subject to changed.

For the most up-to-date required documents, please check the announcement by the academic affairs on the TGGS website

https://tggs.kmutnb.ac.th/admission/apply-now/

6.3 Admission process

There are two steps of selections.

In the first step, the application will be assessed on the basis of the submitted evidence by the recruitment committee, consisting of the lecturers of each programs.

In the second step, the selected applicants will be scheduled for personal interview by the recruitment committee. For international students, the interview by phone or video call can be arranged. The final selection will be done after the interview process.

For the most up-to-date admission process, please check the announcement by the academic affairs on the TGGS website

https://tggs.kmutnb.ac.th/admission/apply-now/

7. Academic collaboration with other international institute

Rheinisch-Westfaelische Technische Hochschule (RWTH) Aachen University, Germany

8. Accreditation standard

AUNQA assessment

9. Graduation requirments

1. Pass all required courses within 5 years with GPA not lower than 3.00
2. English proficiency test score, please check the announcement by the academic affairs on https://tggs.kmutnb.ac.th/graduation for more information
3. For study plan A1 and A2, one publication in internation journal or conference proceedings, of which content is related to the master thesis
4. Pass the thesis/project defense examination and submitted the complete Master thesis/ project report.

10. Education philosophy

The major philosophy of this curriculum is to educate professional engineers with orientation to industry's needs and environments, so that the graduates will be well trained and prepared for performing engineering tasks in advanced level, e.g. research and development, project management, planning of technical policy. The curriculum follows the industry-oriented education model of RWTH Aachen University, which is the co-founder of TGGS. The curriculum establishes firm links and relevance to industry by difference mechanism, such as project based industry internship, master thesis with relevance to industry research projects, which provide opportuinities for students to gain experiences in industry working environments. In addition to the advanced engineering knowledges given by various taught courses, the curriculum also emphasizes the development of social skills for multicultural environment and professional abilities, e.g. communication, presentation, and team-working, which are important requirements for the graduates' career in industry.

Distinctive points of curriculum

The learned courses will support the application and are up-to-date for developing students to create and invent works in Electrical and Computer Engineering by themselves. It will support also self resilient and teamwork skills for harmony and working in a larger scale. Specialized courses will emphasize the teaching approach following the RWTH Aachen model, which is intensive and specialized in researching and solving problems from industry. The teachers will mix the working experience into the teaching class in order to virtualize the actual working situations. Students in the last year will be trained for abilities to speak, to present, and to write engineering reports and to carry out modern projects with engineering advancement as the preparation for career.

11. Objectives of curriculum

This Master program is constructed to teach, instruct, train, guide and transform students to achieve good professional attitudes, professionalism, self and social responsibility, knowledge covering the selected branch in Electrical and Computer Engineering, system thinking as engineers, ability to apply knowledge and to solve engineering problems and to promote research and development works in both industry and academics.

12. Expected Learning Outcomes of Curriculum (ELOs)

The curriculum of Master of Engineering in Electrical and Computer Engineering was revised in 2021 and first used in the academic year 2021. The ELOs of this curriculum must have beed designed based on the objectives and distinctive points of the program. The ELOs for the Master of Engineering in Electrical and Computer Engineering are listed in the following:

Plan A1, A2, and B
Subjected Specific ELOs
1. Explain phenomena in Electrical and Computer Engineering by referring theories in Electrical and Computer Engineering
2. Analyze and find reasons to explain relationships between experimental results and theory in Electrical and Computer Engineering
3. Apply stem knowledge (science, technology, engineering and mathematics) for conducting research and solving problems in Electrical and Computer Engineering
4. Build or adapt models for solving problems including conducting research toward building new knowledge in Electrical and Computer Engineering
5. Design and build electrical circuits, systems, or software using specific knowledge in Electrical and Computer Engineering that are applicable, follows safety principles in Electrical and Computer Engineering and relevant industry standards
Generic ELOs
6. Demonstrate self-reliance for defining and solving specific problems in Electrical and Computer Engineering
7. Demonstrate skills of interpersonal communication and presenting works in Electrical and Computer Engineering to publics
8. Read and comprehend contents in international academic books, documents and research articles in Electrical and Computer Engineering
9. Indicate and show good attitude and professional ethics in Electrical and Computer Engineering