

Thailand International Post Graduate Program: TIPP (2026 – 2028)

Theme: Climate Resilience

- 1) **Course Title:** Master of Engineering Program in Environmental and Water Resources Engineering
- 2) **Master Degree:** Master of Engineering (Environmental and Water Resources Engineering), M.Eng (Environmental and Water Resources Engineering)

- 3) **Academic Institution:** Mahidol University

Mahidol University, the first Siamese medical school, was founded under commissions of King Chulalongkorn in 1888. Becoming the University of Medical Science in 1943. On February 21, 1969, an announcement by His Majesty King Bhumibol Adulyadej, declared the name of the medical university to be changed to Mahidol University in honor of his father Prince Mahidol of Songkla who was also revered as the Father of Modern Thai Medicine. King Bhumibol expressed his will that MU should also expand to Social Science fields. Then, the Faculty of Social Sciences and Humanities was founded in 1969. The construction of Salaya campus began in 1975. It was delayed due to political situation and financial shortage. However, on July 23, 1983, the Salaya campus was officially opened.

The Faculty of Engineering was established in 1989, in response to Thailand's need for engineers as a newly industrialized country. Faculty aims to produce graduates with knowledge and excellence in engineering, who value ethics and feel responsible to the profession and to society. Over the past 30 years, the faculty has shown its excellence in teaching and research in various fields of engineering including Civil and Environmental, Chemical, Computer, Electrical, Industrial, and Mechanical Engineering as well as in interdisciplinary fields such as Biomedical Engineering.

Environmental and Water Resources Engineering program at MU began in 2007 with the need for Environmental and water resources engineering to address the problems of providing adequate water resources, water supplies, wastewater treatments, solid waste management and sanitation facilities. This program is the post graduate program under the faculty of Engineering Mahidol University. This pioneering environmental water resources engineering program has grown into a range of fields needed to tackle the environmental issues facing Asia today. Many alumni from program could help leveling each country according to the environmental and water resources engineering fields.

- 4) **Duration:** 2 Years

5) Background and Rational:

Rapidly expanding technology demands that an engineer has the increased breadth and depth of knowledge. The master's program in Environmental and Water Resources Engineering at Mahidol University strives to provide students with knowledge as it educates the next generation of engineering leaders. The program has embedded the education philosophy of Mahidol University as "administering education that focuses on learners' achievements by means of a learning-centered approach for self-development of knowledge, abilities, and new skills". Development of human resources is very important to the developing countries. The program offers students the opportunity to conduct original research. Such high-level research may contribute to new perspectives in environmental and water resources engineering, or a solution to an existing problem. It also provides students with the opportunity to obtain credentials in the environmental and water resources engineering profession, needed to practice engineering at a high level. The program is dedicated in extending engineering knowledge across the breadth of the discipline and beyond through creative, innovative teaching, and research ranging from fundamentals to applications.

6) Objective:

1. To have virtue, ethics, and follow the professional code of conduct.
2. To be the proficient graduates who have knowledge about environmental engineering and water resources engineering, coupled with research skills to obtain relevant knowledge for solving environmental and water resource problems under a continuous learning process.
3. To be the confident experts who can analyze and apply knowledge in the environmental and water resources engineering fields, and can design engineering processes.
4. To have the responsibility and good human relation skills to be a good leader and follower to achieve goals.
5. To be able to apply statistical and mathematical techniques, information technology, communication, and presentation skills in problem-solving and disseminating knowledge related to environmental and water resources engineering.

7) Course Synopsis and Methodology:

7.1 Study plan

The curriculum structure is in compliance with Announcement of Ministry of Education on the subject of Criteria and Standards of Graduate Studies 2015, M.Sc. Degree, Plan A2 as below.

Plan A2

1) Required courses	15	credits
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2) Elective courses not less than	9	Credits
3) Thesis	12	Credits
Total not less than	36	Credits

Study Plan A2

Year	Summer Semester					
	For students, lacking of the basic knowledge of Environmental and Water Resources Engineering field, students are encouraged to take the course offered in the summer program and result must be "Pass" EGEW 504 Fundamentals of Environmental and Water Resources Engineering 3(3-0-6) Total non-credit credits					
1	Semester 1			Semester 2		
	EGEW 511	Water Quality Engineering	3(2-2-5)	EGEW 522	Research Seminar in Environmental and Water Resources Engineering	3(3-0-6)
	EGEW 513	Solid and Hazardous Waste Management	3(3-0-6)	EGEW XXX	Elective Courses	9 credits
	EGEW 520	Sanitation Systems and Services	3(3-0-6)			
	EGEW 521	Water Resource Systems and Modelling	3(3-0-6)			
	Total 12 credits			Total 12 credits		
2	Semester 1			Semester 2		
	EGEW 698	Thesis	6(0-18-0)	EGEW 698	Thesis	6(0-18-0)
	Total 6 credits			Total 6 credits		

7.2 Course Content

1) Course Description of Mahidol University

1.1) Pre-Course

Credits (lecture-laboratory-self-study)

EGEW 504 Fundamentals of Environmental and Water Resources Engineering
3(3-0-6)

Water supply; wastewater; treatment processes; air pollution; solid waste; regulations and standards; hydrologic cycle; atmospheric water; subsurface water; groundwater; hydrograph theory; flow routing analysis; flow in pipes; open channel flow;

1.2) Required Courses

Credits (lecture-laboratory-self-study)

EGEW 511 Water Quality Engineering 3(2-2-5)

Fresh water resources and ecosystems; sources of water pollution; water quality standards; mass balance; steady-state and response time; fate and transport in aquatic systems; assessment of water quality in river, lake and groundwater; water quality monitoring and management planning; basic concepts from quantitative chemistry; analytical techniques for characterization of water samples; ethics of water quality engineering laboratory

EGEW 513 Solid and Hazardous Waste Management 3(3-0-6)

Public conscious on solid and hazardous waste management; solid waste problem; sources of solid wastes; solid waste generation and characterization; physical, chemical, and biological properties of waste; waste storage, collection and transportation of waste; separation and recycling; waste treatment processing; sanitary landfills; composting; incineration; public and private participation in solid waste management; hazardous waste characterization; hazardous waste management; ethics of solid and hazardous waste management; laws and policies in Environmental Engineering

EGEW 520 Sanitation Systems and Services 3(3-0-6)

Introduction; sanitation and urban development trends and demography; basic service system, health, water, sanitation system and education; sanitation service delivery chains, compendium and system approaches, urban sanitation system planning tools, shit flow diagram, material flow analysis; sanitation system for smart city; urban sanitation system case studies

EGEW 521 Water Resource Systems and Modelling 3(3-0-6)

Watershed system and its hydrology; dam-reservoir system, reservoir-hydropower system, canal irrigation system; overview of water resources modeling; hydrologic modeling; watershed system modeling; hydrodynamic modeling; case study

EGEW 522 Research Seminar in Environmental and Water Resources Engineering
3(3-0-6)

Problem formulation techniques; research seminars; emerging topics in environmental and water resources engineering; research ethics; literature review techniques; design thinking for problem based learning; stakeholder analysis; data collection and analysis techniques; identification of solutions; publication and presentation techniques.

1.3) Elective Courses

Credits (lecture-laboratory-self-study)

EGEW 514 Feasibility Study for Water Resources Project 3(3-0-6)

Feasibility study factors for water resources project; an investigation of existing project condition; alternative plans; public participation; engineering economic in water resource planning; environmental impact assessment; planning for water resources project development; feasibility study report; ethics of feasibility study

EGEW 554 Analysis of Sanitation Flows and Public Health 3(3-0-6)

Sanitation flow; infectious diseases principles and terminology; enteric diseases; health hazards; biological characteristics of relevant enteric pathogens; lifecycles of sanitation related pathogen; classification of water-related and sanitation-related diseases; diseases transmission routes; non-infectious diseases; control measures faecal contamination; interventions and sanitation safety planning; risk evaluation tools

EGEW 555 Sanitation Technology 3(3-0-6)

Urban drainage and sewerage systems; main processes and technologies for the sewage and sludge treatment; carbon, nitrogen and phosphorus removals and recovery; onsite treatment systems; emptying and access; transferring systems; nutrient management and urban low-cost drainage; innovative treatment processes; technology selection tools and decision support systems; case studies and technology evaluation

EGEW 556 Sanitation System Design 3(3-0-6)

Overview of sanitation systems; biological treatment processes; design of onsite treatment systems, septic tank, anaerobic baffle reactor, anaerobic filter; design of faecal sludge treatment systems: sand drying bed, settling tank, constructed wetland, waste stabilization pond; design of co-composting process for faecal sludge; operation and maintenance for sanitation systems

EGEW 557 Air Quality Management and Pollution Control 3(3-0-6)

Air pollution problems, types, sources and effects of air pollutants, indoor and outdoor air pollution; meteorological aspects of air pollution and atmospheric self-purifying processes; air quality management; air quality standards and regulations; air pollution control programs, air pollution monitoring, air pollution modeling, air pollution control principles and technologies; ethics in air quality management and pollution control; emerging issues in air quality management and pollution control

EGEW 558 Physico-Chemical Processes for Water and Wastewater Treatment Systems 3(3-0-6)

Physical processes for water and wastewater treatment; screen; grit removal; mixing; flotation; sedimentation; adsorption; filtration; and drying. Chemical processes for water and wastewater treatment; coagulation; flocculation; chemical precipitation

EGEW 559 Biological Processes and Wastewater Treatment Systems 3(3-0-6)

Biological systems for wastewater treatment; fundamental of biological kinetics; reaction rates; process calculations and process analysis; aerobic and anaerobic biological treatment; application in wastewater treatment systems; suspended growth and attached growth treatment systems; activated sludge process; pond systems; trickling filter; Rotating Biological Contactor (RBC); Upflow Anaerobic Sludge Blanket (UASB) process; Sequencing Batch Reactor (SBR) system; Constructed Wetlands (CWs) system

EGEW 560 Circular Economy and Waste Reuse and Recycling 3(3-0-6)

Circular Economy, engineering principles of waste reuse and recycling; characteristics of organic wastes; composting; anaerobic digestion; biomass and biofuel production; waste energy; algae and fish production; aquatic weeds and their uses; engineering applications and utilization of the reclaimed products; environmental and social impact of the recycling processes

EGEW 561 Life Cycle Engineering and Management 3(3-0-6)

Basics of life cycle engineering; engineering in life cycle assessment; goal and scope definition; life cycle inventory analysis; life cycle impact assessment; life cycle interpretation; improvement analysis; modelling choices in life cycle engineering; computer programs for life cycle engineering; life cycle engineering applications; life cycle management; economic and social aspects in life cycle engineering; life cycle sustainability assessment and management; ethics in life cycle engineering and management

EGEW 562 Emerging Contaminants in the Environment 3(3-0-6)

Persistent Organic Pollutants (POPs); Pharmaceuticals and Personal Care Products (PPCPs); microplastics; nanoplastics; analytical methods; occurrence; transport and fate of emerging contaminants; risk assessment and management; removal and destruction techniques of emerging contaminants; case studies

EGEW 563 Analysis and Mitigation of Floods 3(3-0-6)

Origins of flood; determination of flood discharges; mathematical models for flood investigation; flood control structure and equipment; flood mitigation measures; cost and benefits analysis for flood mitigation projects

EGEW 564 Hydroinformatics in Advanced Water Resources Engineering 3(3-0-6)

Principle of hydroinformatics; system simulation technique; optimization technique; Artificial Intelligence (AI) for water resources management; fuzzy logic; genetic algorithm; machine learning; deep learning; multi-agent systems; Geographic Information System (GIS)-Remote Sensing (RS) and its application; process-based modelling, object-oriented approach; applications of hydroinformatics for water resources management

EGEW 565 Climate Change Impacts on Water Resources 3(3-0-6)

Definitions of climate; climate system and climate change; impact of climate change; the relationship between climate change and hydrological processes; mitigation of climate change impact on water resources; case study: water resources planning and managements under climate change situation

EGEW 566 Geospatial Technology for Sustainable Environmental Management 3(3-0-6)

Geospatial technology's theory and components; geographic information systems; GNSS Technology; satellite remote sensing; internet GIS; operation and spatial analysis; participatory GIS; sustainable development; case study and applications

EGEW 567 Special Study in Environmental and Water Resources Engineering 3(3-0-6)

Special or experimental study in selected topics; in-depth analysis; advanced and comprehensive study for solving environmental and water resources problems

1.4) Thesis

Credits (lecture-laboratory-self-study)

EGEW 698 Thesis 12(0-36-0)

Development of environmental and water resources engineering research proposal; conducting research with concern of research ethics; data collection; analysis and interpretation of the research results; thesis reporting; presenting and publishing research in academic journals or proceeding or conference

1.5) Thematic Paper

Credits (lecture-laboratory-self-study)

EGEW 697 Thematic Paper 6(0-18-0)

Development of environmental and water resources engineering thematic paper proposal; conducting research with concern of research ethics; data collection; analysis and interpretation of the research results; thematic paper; presenting and publishing thematic paper or part of the thematic paper in searchable forms

8) Graduation Conditions:

8.1 The duration of the study is in accordance with the study plan.

8.2 Students must complete all courses as stated in the curriculum, at least 24 credits of the courses and 12 credits of thesis for a total of not less than 36 credits, with a minimum cumulative GPA of 3.00.

8.3 Students must fulfill the English language proficiency according to the requirements of the Faculty of Graduate Studies, Mahidol University.

8.4 Students must fulfill the requirement of soft skill participation activities according to the requirements of the Faculty of Graduate Studies, Mahidol University.

8.5 Students must submit theses and pass the thesis defense examination by following the Regulations of Mahidol University for Graduate Studies. The thesis examination must be an examination open to a general audience.

8.6 Thesis or a part of the thesis must be presented at an academic conference and published in the conference proceedings according to the announcement of the Faculty of Graduate Studies and Office of the Higher Education Commission or published or accepted for publication in a national or international peer-reviewed journal.

Grading system

Mahidol University	
A	Excellent
B+	Very Good
B	Good
C+	Fair Good
C	Fair
D+	Poor
D	Very Poor
F	Fail
S	Satisfactory

9) Application Qualifications:

9.1 Plan A2

- (1) Students must hold a bachelor's degree in any field of engineering or science from higher education institutions accredited by the Office of the Higher Education Commission.
- (2) Must have a cumulative GPA of at least 2.50.
- (3) Must have English scores according to the requirements of the Faculty of Graduate Studies, Mahidol University.
- (4) Exceptions to items (2) and (3) may be made by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies.

- (5) Students who are interested in studying at the Graduate School of Global Environmental Studies, Kyoto University, Japan, must have English scores according to the requirements of the Graduate School of Global Environmental Studies, Kyoto University.

10) Document Required:

10.1 Transcript

10.2 English Test certificate (IELTS>5 or equivalence)

10.3 Propose of statement

10.4 Recommended letter

10.5 Medical certificate

10.5 Application form can be download form https://tica-thaigov.mfa.go.th/en/page/75500-tipp-application-form?menu_605b13dbb6f1b76ed31778b3

11) Contact:

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