Course Detail

Master of Engineering Program in Environmental Engineering

Course Title: Master of Engineering Program in Environmental Engineering

Master Degree: M. Eng. (Environmental Engineering)

Academic Institution: Faculty of Engineering, Naresuan University

Duration: 2 years (June 2022 – March 2024)
First Semester : June - October
Second Semester : November – March

Background and Rational:

Environmental issues directly affect the potential for economic and social development, especially the impact it will have on agriculture, industry and tourism. Which is a key component of the country's economic development. Environmental engineering courses must cover both basic knowledge and new methods. Therefore, Master of Engineering in Environmental Engineering that can be developed according to modern technology and rapidly changing Include the potential to produce environmental engineering personnel who are ready to work immediately and have high potential to develop themselves to suit both academic and professional work.

In this program, research in environmental engineering involve the treatment and distribution of drinking water; the collection, treatment, and disposal of wastewater; the control of air pollution and noise pollution; municipal solid-waste management and hazardous-waste management; the cleanup of hazardous-waste sites; and the preparation of environmental assessments, audits, and impact studies. Mathematical modeling and computer analysis are widely used to evaluate and design the systems required for such tasks. Environmental engineering functions include applied research and teaching; project planning and management; the design, construction, and operation of facilities; the sale and marketing of environmental-control equipment; and the enforcement of environmental standards and regulations.

The education of environmental engineers involves graduate-level course work to specialize or take elective courses in the environmental field. Program is available for training. In the public sector, graduates will be trained by national and regional environmental agencies, local health departments, and municipal engineering and public works departments. In the private sector, graduates will be trained by consulting engineering firms, construction contractors, water and sewerage utility companies, and manufacturing industries.

The main mission of Naresuan University is to develop into a quality higher education institution that meets international standards. The four missions of Naresuan University consist of producing graduates, research, academic service and the making of arts and culture. Therefore, it is part of the mission of Naresuan University in teaching and learning in the integrated science and technology to provide graduates with diverse and up-to-date knowledge and skills. It also distributes opportunities and equality in education to the people of the region, the country and the abroad for continuous human resource development.

Objectives:

1. To produce graduates with modern academic knowledge and advanced engineering skills in designing, controlling and supervising processes of water, air pollution treatment unit, solid waste and hazardous waste management and the potential to develop advanced technology, research and improve technology to be suitable for industry, community and local.

2. To produce quality academic work based on research topics that are consistent with the missions of Naresuan University and the country.

3. To provide services and cooperation with various agencies, both governmental and private sector, both academic and research which requires advanced environmental engineering knowledge as well as exchange and help in knowledge between academics in national and international educational institutions and research institutes.

Course Synopsis and Methodology:

1. Study plan

(1) Plan A (Type A1)

Year I
First Semester

307581	Research Methodology in Science and Technology (Non-credit)	3(3-0-6)
307591	Thesis 1, Type A1	9 Credits
	Total	**9 Credits**

Year I
Second Semester

307592	Thesis 2, Type A1	9 Credits
307582	Seminar 2 (Non-credit)	1(0-3-1)
	Total	**9 Credits**

Year II
First Semester

307593	Thesis 3, Type A1	9 Credits
	Total	**9 Credits**

Year II
Second Semester

307594	Thesis 4, Type A1	9 Credits
	Total	**9 Credits**

(2) Plan A (Type A2)

Year I
First Semester

307501	Principle of Environmental Chemistry and Analysis	3(2-2-5)
307502	Principle of Environmental Engineering	3(2-2-5)
307503	Membrane Technology for Water Quality Management	3(2-2-5)
307504	Advanced Environmental Modelling and Prediction	3(2-2-5)
307581	Research Methodology in Science and Technology (Non-credit)	3(3-0-6)
	Total	**12 Credits**

Year I
Second Semester

307582	Seminar (Non-credit)	1(0-3-1)
307505	Remediation Technology for Soil and Groundwater	3(2-2-5)
307xxx	Elective Course (1)	3(2-2-5)
3xxxxx	Elective Course (2)	3(x-x-x)
307595	Thesis 1, Type A2	3 Credits
	Total	**12 Credits**

Year II
First Semester

307579	Current Issue in Environmental Engineering	3(2-2-5)
307596	Thesis 2, Type A2	3 Credits
	Total	**6 Credits**

Year II
Second Semester

307597	Thesis 3, Type A2	6 Credits
	Total	**6 Credits**

(3) Plan B

Year I
First Semester

307501	Principle of Environmental Chemistry and Analysis	3(2-2-5)
307502	Principle of Environmental Engineering	3(2-2-5)
307503	Membrane Technology for Water Quality Management	3(2-2-5)
307504	Advanced Environmental Modelling and Prediction	3(2-2-5)
307571	Independent Study 1	1 Credits
307581	Research Methodology in Science and Technology (Non-credit)	3(3-0-6)
	Total	**12 Credits**

Year I
Second Semester

307582	Seminar (Non-credit)	1(0-3-1)
307505	Remediation Technology for Soil and Groundwater	3(2-2-5)
307xxx	Elective Course (1)	3(2-2-5)
3xxxxx	Elective Course (2)	3(x-x-x)
3xxxxx	Elective Course (3)	3(x-x-x)
307572	Independent Study 2	1 Credits
	Total	**13 Credits**

Year II
First Semester

307579	Current Issue in Environmental Engineering	3(2-2-5)
307573	Independent Study 3	2 Credits
	Total	**5 Credits**

Year II
Second Semester

3xxxxx	Elective Course (4)	3(x-x-x)
307574	Independent Study 4	2 Credits
	Total	**5 Credits**

- Thesis topic submission due on March 2023
- Thesis proposal examination due on October 2024
- Fieldwork data collection due on October 2024
- Thesis defense examination due on March 2025

2. Course Content

302544 Energy Conversion 3(3-0-6)

Forms of energy and their interrelationships; classification of power plant; practical cycles for power plant; effects of variables on efficiency; comparison of steam, gas turbine, and internal combustion engine plant; fuel quality requirement; emissions; selection of plants for given applications :economic, technical, resource use, and environmental factors

302546 Energy Conservation and Management 3(3-0-6)

Principles of energy conservation; energy auditing and costing; controlling and planning; energy measurement; industrial and commercial air conditioning; electricity; renewable energy resources in industry; assessment of energy systems; case studies

302547 Renewable Energy Resources 3(3-0-6)

Renewable energy resources : solar energy, wind energy, biomass, hydropower, geothermal energy, tidal power, with special references to Thailand; development of technologies for use and conversion of renewable energy; technical and economic feasibility

304537 Application of Remote Sensing and Geographic Information Systems for Engineers 3(2-3-5)

Theoretical concepts and procedures of Geographic Information Systems (GIS); developing computing skills related to GIS; providing basic spatial analysis skills; applications of GIS and remote sensing technologies for environmental and water resource areas

304546 Groundwater Hydraulics 3(3-0-6)

Physical flow characteristics of groundwater flow; mechanics of flow through porous media; Darcy's law; Laplace equation; solution of Laplace equation by analytical, graphical, and numerical methods; steady and unsteady flow through isentropic and an-isentropic porous media; seepage through earthen dams, embankments, and foundation; flow to wells, subsurface drains, and drainage ditches; solute transport models; freshwater-salt water interface

304547 Flood Protection and Drainage 3(3-0-6)

Causes of flood; hydrologic and hydraulic studies of flood and storm characteristics; design flood and storm; preliminary design and planning of flood mitigation measures; flood control reservoir; level and floodwalls; flood diversion channel; channel improvement; evaluation and floodplain zoning/flood retention basin; preliminary design and planning of urban drainage systems; system lay-out; estimate of runoff quantities and sewer sizes; effect of retention storage; pump and gate operation

307501 Principle of Environmental Chemistry and Analysis 3(2-2-5)

Fundamental concept in chemistry, chemistry of water, kinetic chemistry, equilibrium chemistry, precipitation and dissolution, oxidation- reduction reaction, organic chemistry, biological chemistry, application of chemistry principle for prediction or estimation of fate and transport of pollutants in natural water and treatment system, laboratory analysis of water quality, principle of advanced analytical instruments for pollutants measurement

307502 Principle of Environmental Engineering 3(2-2-5)

General concept of water, air, and soil pollutions; causes of pollution problems and their preventions; treatment, technology, and current solution in Thailand and other countries; determination of pollution control area; factor analysis of pollution management; policy and management plan of pollution in Thailand; analysis and propose of practical plan pollution situation in Thailand

307503 Membrane Technology for Water Quality Management 3(2-2-5)

Theories and advanced processes for producing portable water by membrane technology, drinking water, and industrial water; water recycling and reuse; membrane types; calculation and plant design; case study

307504 Advanced Environmental Modelling and Prediction 3(2-2-5)

Mathematical modeling development for environmental system simulation; numerical methods for solving equations; development of mathematical modeling for calculation of surface water and groundwater flow; simulation of pollutant distribution in air, surface water, and groundwater; mathematical modeling for health risk assessment and site remediation

307505 Remediation Technology for Soil and Groundwater 3(2-2-5)

Environmental and health impact due to environmental contamination by hazardous compounds; monitoring; site investigation and characterization; risk assessment; selection of remedial technologies; evaluation of site remediation efficiency

307510 Advanced Wastewater Treatment Process 3(2-2-5)

Advanced technologies and processes for treatment of recalcitrant compounds in wastewater; processes for industrial wastewater reuse; advanced oxidation; adsorption; ion exchange; membrane filtration; biological wastewater treatment for toxic substances; emerging technologies

307511 Sewerage and Water Distribution Systems 3(2-2-5)

Water demand and wastewater flow rate; hydraulics of water flow in pipe; water intake system; water storage system; design of water transmission and distribution system; relation between rainfall-duration-frequency; specification and magnitude of flood; estimation of rainfall and runoff; calculation of sewer system; pumps and pump stations; design of drainage and collection system

307512 Water and Wastewater Treatment Plant Operation and Management 3(2-2-5)

Principle of plant operation; chemical and biological measurement; data record and interpretation for problem analysis and solving; management and control of mechanical and electrical systems in a wastewater treatment plant including pumping, aeration, mixing, chemical feeding, sensor, and computer systems for water distribution and wastewater treatment; maintenance and monitoring

307513 Waste Utilization 3(2-2-5)

Types of waste; nature and properties of waste (liquid, solid, air); generation sources and formation process of wastes; effects on the environment; current management philosophy; necessary regulation and standard; policy and plan; best available engineering technology in reuse and utilization of wastewater, sludge utilization and soil waste; management organization; economic analysis

307514 Industrial and Hazardous Waste Management 3(2-2-5)

Classification and characterization of hazardous waste; physicochemical and biological properties of hazardous waste; fate and transport of hazardous waste in environment; toxicology and risk assessment; hazardous waste treatment and disposal technology; site remediation

307515 Air System Design for Industrial Sectors 3(2-2-5)

Principles and design of air pollution control units for particulate and gases for industry; gravity setters; incinerators; cyclones; electrostatic precipitators; fabric filters; wet scrubbers; adsorption; absorption; ventilation system design for industry; operation and maintenance

307516 Advanced Biological Treatment Process 3(2-2-5)

The definition of growth, measurement of growth and growth yields of microorganisms. Different modes of nutrition in bacteria; sulfate reduction, phosphorus metabolism, nitrogen metabolism – nitrifying and denitrifying bacteria, nitrogen fixation and microbes used as biofertilizer. Different modes of operation in bioprocess for wastewater treatment; aerobic and anaerobic. Influences of environmental factor for pollutant removal and biogas production through microorganism metabolism. The hybrid of bioprocess and other technologies such as filtration and adsorption for improvement of water quality.

307520 Environmental and Health Impact Assessment 3(2-2-5)

System analysis; methods for environmental risk assessment; exposure- response relationships; quantitative risk assessment; concept of health impact assessment and method; implementation

307521 Solid Waste Management 3(2-2-5)

Need for integrated solid waste management; characterization and properties of MSW; collection, transfer, and transport of solid waste; separation, pre-treatment, and recycling of waste material; solid disposal waste by combustion process and incinerator; landfill design for solid waste disposal; compositing of solid waste; alternative approaches such as waste- to- energy, methane generation by anaerobic digestion

307522 Sampling Technology and Air Pollution Control 3(2-2-5)

Introduction to air pollution; air pollutant and sources; effects of air pollution; air pollution meteorology; atmospheric pollutant sampling and analysis; gaussian equation and other air pollution models; pollutant and gas control; laws and regulations

307523 Global Warming and Climate Change 3(2-2-5)

Global warming problem; theory and evidence of climate change; greenhouse phenomenon; ozone depletion; change of sea level; impacts of climate change on hydrology, food and water deficiency, and alteration of disease; impact mitigation measures for agricultural, industrial, and residential stakeholders; Thailand and the impact of global warming

307524 Evaluation of Water and Wastewater Treatment Technology 3(2-2-5)

Principles and mechanisms of water quality improvement engineering; analysis of system problems; by-products control; case studies; construction; system design and economic cost-effectiveness.

307525 Economic Analysis of Water Reuse 3(2-2-5)

Water balance analysis; appropriate organizations and management structures; water management policies and guidelines covering legal, economic, social, and environmental aspects; sustainable development; planning system in water resources development; remote sensing and geographical information systems for water resources management; statistics for water resources engineering

307526 Environmental Forensics 3(2-2-5)

Fundamentals of environmental forensic science and environmental pollution, random sampling, data collection methods analysis, and research statistics for investigation of crimes against the environment; case studies on applying forensic technique to analyze environmental evidence.

307527 Safety and Environment Management in Workplace 3(2-2-5)

Knowledge on risk and hazard in workplaces; risk assessment; theories of accident causation; accident analysis and prevention; mechanical hazard, fire and explosion hazard; chemical hazard; radioactive hazard; noise hazard; plant layout; personal protective equipment; maintenance and engineering control; emergency plan and monitoring; law and standard

307528 Community Health Development 3(2-2-5)

Community development; educational process and management for people to be self-reliant; study and analyze the structure of Thai society; elements influencing the development of health in the community; participation in health and community development; self and community health care; individual and community health problems; importance of environmental health; the relationship between humans and the environment in terms of ecology; elements of the environment which affects the well-being and health of human beings; residential sanitation; school; community; drinking water; water use; disposal and control of sewage and nuisance; noise; smell; smoke; air; case study; health development in communities in developed and developing countries

307529 Environmental Law and Policy 3(2-2-5)

Background of environmental law; legislation principle; national and international environmental laws; relationships and roles of environmental organizations; environmental policy and management for organizations

307571 Independent Study 1 1 Credits

Literature review in various databases, compilation of fundamental knowledge and research articles on topics of interest, finding and creating of guideline for hypothesis establishment, presenting summary report of independent study and progress report

307572 Independent Study 2 1 Credits

Allocation of guidelines and framework for independent study, conducting research, proposal independent study, presenting summary report of independent study and progress report

307573 Independent Study 3 2 Credits

Review of research, writing research articles in environmental engineering area and improvement and modification of research articles due to expert opinions, presenting summary report of independent study and progress

307574 Independent Study 4 2 Credits

Defending independent study examination, correcting an independent study report according to comments from the examiners, writing a final independent study defense and submit to the graduate school

307579 Current Issue in Environmental Engineering 3(2-2-5)

Study on current issues that related to environmental engineering in the present and the future trend

307581 Research Methodology in Science and Technology 3(3-0-6)

Research definition, characteristics and goal; types and research process; research problem determination; variables and hypothesis; data collection, data analysis, proposal and research report writing; research evaluation; research application; ethics of researchers; and research techniques in science and technology

307582 Seminar 1(0-3-1)

Report and discuss topics related to environmental engineering

307591 Thesis 1, Type A1 9 Credits

Studying the elements of a thesis; reviewing literature and related research; and determining the thesis title

307592 Thesis 2, Type A1 9 Credits

Developing a concept paper and preparing a summary of the literature and related synthesis

307593 Thesis 3, Type A1 9 Credits

Developing research instruments and research methodology; and preparing a thesis proposal in order to present it to the committee

307594 Thesis 4, Type A1 9 Credits

Collecting data; analyzing data; preparing a progress report in order to present it to the thesis advisor; and preparing the full-text thesis and a research article in order to get published according to the graduation criteria

307595 Thesis 1, Type A2 3 Credits

Study the elements of thesis or thesis examples in the related field of study, determine thesis title, develop concept paper, and prepare the summary of literature and related research synthesis

307596 Thesis 2, Type A2 3 Credits

Develop research instruments and research methodology and prepare thesis proposal in order to present it to the committee

307597 Thesis 3, Type A2 6 Credits

Collect data, analyze data, prepare progress report in order to present it to the thesis advisor, and prepare full-text thesis and research article in order to get published according to the graduation criteria

314531 Health Management 3(3-0-6)

Introduction to the evolving role of public health and epidemiology in disaster preparedness and response, standards of disaster health management and resources, ethical, cultural and legal aspects of disaster health care, principles of on scene and hospital management, roles of emergency services, challenges of medical care in the disaster environment, epidemiology of disasters including types, severity and economic, human and societal impact, psychological impact of disasters on individual, populations and responders

Graduation Conditions:

Accordance with Naresuan University Regulations for Graduate Studies B.E. 2016 and Naresuan University Regulations for Graduate Studies 3rd Addition Edition B.E. 2020. The criteria for graduation are as stated in the 2016 university regulations for graduated studies as described below:

Curriculum Type A 1 Under Naresuan University Regulation

1. Complete within the length of time required for the programme
2. Complete all the courses as required by the programme
3. Meet the English requirement stated by the university
4. Present and pass the oral examination
5. A work or part of work based on the student's thesis must be published as research paper or accepted for publication in national or international journal that meet with the quality standard as announce by Higher Education Commission.

Curriculum Type A 2 Under Naresuan University Regulation

1. Complete within the length of time required for the programme
2. Complete all the courses as required by the programme
3. Meet the English requirement stated by the university
4. Pass all the courses required by the curriculum
5. Minimum GPA of 3.00
6. Present and pass the oral examination
7. A work or part of work based on the student's thesis must be published as research paper or accepted for publication in national or international journal that meet with the quality standard as announce by Higher Education Commission or present as research paper in an academic conference with the full paper published in the conference proceedings.

Curriculum Type B Under Naresuan University Regulation

1. Having completed the duration of study as specified by the course
2. Having registered all courses as required by the course
3. Having passed the English proficiency test as announced by the University
4. Having completed all courses and passed all conditions as specified in the course
5. Having a grade point average of not less than 3.00
6. Having passed the comprehensive examination
7. Having completed the report of Independent Study and passed the final oral examination by the university's committee
8. Independent Study or a part of it has been published or presented in an academic conference as the full paper, and been published as the proceeding from that conference

Applicant Qualifications

Plan A, Type A1

1) Applicants are required to have at least bachelor's degree with GPA 3.00/4.00 in Environmental Engineering or Science or a relevant degree.

Plan A, Type A2

1) Applicants are required to have at least bachelor's degree with GPA 2.50/4.00 in Environmental Engineering or Science or a relevant degree.

Plan B

1) Applicants must hold a bachelor's degree in any field or major related to Environmental Engineering from an accredited academic institution and applicants must have at least 1 year of work experience or are working in a field related to environmental engineering.

Document Required:

- Applicants for Plan A and B are required to submit their CV, English Test, and a brief research proposal (a maximum of three pages of A4 paper). The brief research proposal must cover principles and rationale, objectives, research methodology, and significance/expected outcomes.

Contact:

1. Curriculum Head:

Associate Professor Dr. Pajaree Tongsanit
Lecturers Responsible for the Curriculum
Department of Civil Engineering, Faculty of Engineering,
Naresuan University, Tampon Thapho,
Amphoe Muang Phitsanulok 65000 Thailand
Tel: +66-55-96-4089 E-mail: pajareet@nu.ac.th

2. Curriculum coordinator:

Miss Rungnapa Thuamthaisong
Academic Officer and International Relationship Officer
Graduate Study Unit, Educational Service Section, Office of the Secretary,
Faculty of Engineering Naresuan University, Muang District,
Phitsanulok 65000 Thailand
Tel: +66-55-96-4007 Fax: +66-55-96-4000 E-mail: rungnaphat@nu.ac.th

For more information:

Human Resources Development Cooperation Division
Thailand International Cooperation Agency (TICA)
Government Complex, Building B (South Zone), 8th Floor,
Chaengwattana Rd. Laksi District, Bangkok 10210 THAILAND
Tel. +66 (2) 203 5000 ext. 43305, 43306 Fax: +66 (2) 143 8451
E-mail: tipp@mfa.mail.go.th

***The application procedure will complete when TICA has received the hard copy of the application form and other related documents through the Royal Thai Embassy/Permanent Mission of Thailand to the United Nations/Royal Thai Consulate – General accredited to eligible countries/territories.