

11.1 ABOUT THE PROGRAM

The UP Environmental Engineering Program (EnE) of the University of the Philippines in Diliman was established in 1973. It is a transdisciplinary and multi-departmental research and academic unit of the University of the Philippines-College of Engineering intended to provide advanced environmental engineering studies and aimed to produce well-trained graduates who are capable of working in the academe, industry and government as faculty members, researchers, and practitioners. The participating departments/institute from the College of Engineering are Chemical Engineering (ChE), Civil Engineering (CE), Geodetic Engineering (GE), Industrial Engineering and Operations Research (IEOR), Mechanical Engineering (ME), Mining, Metallurgical and Materials Engineering (MMME) and Computer Science (CS). It is the host institution for environmental engineering under the ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED-Net) within the ASEAN region.

EnE maintains an active linkage with international organizations, university and industry networks. The faculty members have a wide range of experience and expertise locally and internationally. The areas of expertise include biological and chemical wastewater treatment, environmental impact assessment, environmental database management, air and water quality monitoring, modeling and assessment, and solid and hazardous waste management. EnE has laboratories to support the research activities of EnE graduate students.

11.2 VISION

The UPD Environmental Engineering program shall develop into a leading academic institute in the Asia-Pacific region for environmental engineering research and technology innovation that serve the nation and improve the quality of life.

11.3 MISSION

- To provide excellent graduate environmental engineering education that promotes responsible stewardship of the earth's resources
- To generate knowledge and innovations that address challenges in striking a balance between serving humanity and protecting the environment
- To promote proactive, interdisciplinary and multi-sectoral initiatives that respond to local and global environmental problems

11.4 GRADUATE PROGRAMS

The M.S. and Ph.D. in Environmental Engineering is awarded to a graduate student after a demonstrated mastery of subject matters in environmental engineering and proven competence in the conduct of individual research that represents an original contribution to knowledge. There are five (5) tracks/fields of specialization:

- Air Quality Management
- Water Quality Management
- Solid and Hazardous Waste Management
- Geoenvironment Quality Management
- Environmental Systems Engineering

11.4.1 Master of Science in Environmental Engineering

The Master of Science in Environmental Engineering (M.S. EnE) program aims to provide advanced and specialized training in environmental engineering which includes water quality control, wastewater disposal and treatment, design courses in biological, chemical, and advanced treatment processes, pollution control, solid waste management, environmental impact assessment and related concerns.

The two-year curriculum leading to the M.S. EnE degree is so designed that fundamental concepts of Environmental Engineering and their applications to environmental problems are given equal emphasis. To qualify for the M.S. EnE degree, a student must complete a minimum of 24 units of coursework and 6 units of thesis.

11.4.2 Doctor of Philosophy in Environmental Engineering

The Doctor of Philosophy in Environmental Engineering (Ph.D. EnE) program was instituted in 2006 to provide advanced graduate training in the field of environmental engineering in the context of sustainable development highlighting practical research of special interest to the concerns of our country, the Asia Pacific region and the rest of the world.

Many critical environmental issues such as safe drinking water, solid waste disposal, hazardous waste and wastewater management, poor air quality, soil and groundwater contamination, and environmental degradation all require multidisciplinary and collaborative solutions. This interface provided by environmental engineering with other fields allow for interdisciplinary research and teaching that promotes innovation and sustainability.

There are two ways of entry for a student planning to take Ph.D. EnE: either as straight Ph.D. (graduate of B.S. course) or Ph.D. after finishing M.S. degree. To qualify for the Ph.D. EnE degree, a student must

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complete a minimum of 24 units of graduate courses (if one has a master's degree), or a minimum of 45 units (if one has a bachelor's degree) with additional credit of 12 units of dissertation.

11.5 FACILITIES AND SERVICES

The Environmental Engineering Unit has two laboratories housed at the ground level of the National Engineering Center building and in the ground level of the National Hydraulic Research Center. These laboratories are used for instruction and research. The laboratories are equipped with new instrumentation equipment, which were acquired through the Department of Science and Technology - Engineering and Science Education Project (DOST-ESEP), the Engineering Research and Development for Technology (ERDT), and other foreign and local research partners.

The new Environmental and Energy Engineering building will soon be used by the graduate program for all its activities. Located at the Engineering Complex along De los Reyes Street, it will house laboratories for the different research tracks, administration offices, and classrooms.

11.6 FACULTY AND STAFF

Program Coordinator

Dr. Maria Antonia N. Tanchuling
Institute of Civil Engineering

Environmental Engineering Committee

Dr. Maria Antonia N. Tanchuling, Chair
Dr. Menandro S. Berana
Dr. Vena Pearl A. Boñgolan
Dr. Rhodora G. Gonzalez
Dr. Herman D. Mendoza
Dr. Analiza P. Rollon
Dr. Virginia J. Soriano

Faculty From Other Departments and Institute

Department of Chemical Engineering

Dr. Florencio C. Ballesteros, Jr.
Dr. Mark Daniel G. de Luna
Dr. Rizalinda L. de Leon
Dr. Analiza P. Rollon

Institute of Civil Engineering

Dr. Nathaniel B. Diola
Dr. Eugene C. Herrera
Dr. Augustus P. Resurreccion

Dr. Ricardo G. Sigua
Dr. Guillermo Q. Tabios III
Dr. Maria Antonia N. Tanchuling
Dr. Karl N. Vergel
Dr. Mark Albert H. Zarco

Department of Computer Science

Dr. Vena Pearl A. Boñgolan
Dr. Adrian Roy L. Valdez

Department of Geodetic Engineering

Dr. Ariel C. Blanco
Dr. Rhodora G. Gonzalez
Dr. Enrico C. Paringit

Department of Industrial Engineering and Operations Research

Dr. Aura C. Matias
Dr. Virginia J. Soriano
Dr. Mili-Ann M. Tamayao

Department of Mechanical Engineering

Dr. Menandro S. Berana
Dr. Edwin N. Quiros

Department of Mining, Metallurgical and Materials Engineering

Dr. Leslie Joy Lanticse-Diaz
Dr. Herman D. Mendoza

Lecturers

Dr. Ruji P. Medina
Engr. Cherry B. Rivera

Support Staff

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CONTACT INFORMATION

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11.7 GRADUATE PROGRAMS CURRICULA

Master of Science in Environmental Engineering (M.S. EnE)

Program Checklist

COURSE NUMBER	TITLE	UNITS
Lecture Courses		12
EnE 201	Introduction to Environmental Engineering	3
EnE 210	Water Quality Control & Management	3
EnE 213	Biological Treatment Plant Design	3
EnE 214	Chemical Treatment Plant Design	3
EnE 215	Tertiary Treatment of Process Water	3
EnE 250	Air Pollution	3
EnE 251	Particulate Systems	3
EnE 270	Solid Waste Disposal and Management	3
EnE 280	Environmental Impact Assessment	3
EnE 298	Special Problems in Environmental Engineering	3
Laboratory Course		3
EnE 205	Environmental Engineering Laboratory I (Required)	3
EnE 220	Environmental Engineering Laboratory II (Elective)	3
Applied Mathematics		6
ES 201	Advanced Mathematical Methods in Engineering I	3
ES 204	Numerical Methods in Engineering	3
Electives¹		3
ChE 266	Waste Utilization	3
ChE 292	Biochemical Engineering	3
GmE 203	Principles of Geographic Information Systems	3
EnE 298	A – Hazardous Waste Management	3
EnE 298	B – Environmental Health Engineering	3
EnE 298	C – Environmental Management System	3
EnE 298	D – Environmental Implications of Energy Devt. Projects	3
EnE 298	E – Emerging Issues in Environmental Engineering	3
Graduate Seminar²		1
EnE 296	Graduate Seminar (Numerical grade not required)	1
Thesis		6
EnE 300	Thesis	6
Total Number of Units		31

Notes:

¹ Requires approval of program adviser, EnE courses as electives are given priority.

² Attendance in Thesis colloquia is also required.

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Master of Science in Environmental Engineering

Total Number of Units: 31 units

FIRST YEAR			
1ST Semester	12 units	2nd Semester	12 units
EnE 201	3	Major course*	3
EnE 205	3	Major Course*	3
ES 201	3	Major Course*	3
ES 204	3	Elective	3
SECOND YEAR			
1ST Semester	4 units	2nd Semester	3 units
EnE 296	1	EnE 300	3
EnE 300	3		

*** List of Major Courses**

EnE 210	Water Quality Control and Management
EnE 213	Biological Treatment Plant Design
EnE 214	Chemical Treatment Plant Design
EnE 215	Tertiary Treatment of Process Water
EnE 250	Air Pollution
EnE 251	Particulate Systems
EnE 270	Solid Waste Disposal & Management
EnE 280	Environmental Impact Assessment
EnE 372	Hazardous Waste Management
ChE 266	Waste Utilization
GmE 203	Principles of Geographic Information Systems
Meteo 283	Air Pollution Meteorology
MSE 268	Degradation of Materials

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Doctor of Philosophy in Environmental Engineering (Ph.D. EnE)**For M.S. degree holders**

Program Checklist

COURSE NO.	TITLE	UNITS
	Core Courses	12
EnE 302	Chemical Processes in Environmental Engineering	3
EnE 303	Biological Processes in Environmental Engineering	3
EnE 304	Numerical Solutions in Environmental Engineering	3
EnE 305	Environmental Modeling	3
	Specialization Courses	12
	Air Pollution	
EnE 251	Particulate Systems	3
ME 286	Combustion	3
ME 287	Fuels and Thermal Power	3
MSE 267	Surface Science	3
	Solid and Hazardous Waste	
EnE 372	Hazardous Waste Management	3
EnE 382	Environmental Health Engineering	3
CE 318	Groundwater Flow and Contaminant Transport	3
CE 264	Geotechnical Engineering	3
	Water and Wastewater	
EnE 210	Water Quality Control and Management	3
EnE 213	Biological Treatment Plant Design	3
EnE 214	Chemical Treatment Plant Design	3
EnE 215	Tertiary Treatment of Process Water	3
	Dissertation	12
EnE 400	Dissertation	12
	Total Number of Units	36

ENVIRONMENTAL ENGINEERING PROGRAM**Doctor of Philosophy in Environmental Engineering (Ph.D. EnE)**

For B.S. degree holders

Program Checklist

COURSE NO.	TITLE	UNITS
Core Courses		27
EnE 201	Introduction to Environmental Engineering	3
EnE 205	Environmental Engineering Laboratory 1	3
EnE 250	Air Pollution	3
EnE 270	Solid Waste Disposal and Management	3
EnE 280	Environmental Impact Assessment	3
EnE 302	Chemical Processes in Environmental Engineering	3
EnE 303	Biological Processes in Environmental Engineering	3
EnE 304	Numerical Solutions in Environmental Engineering	3
EnE 305	Environmental Modeling	3
Specialization Courses		12
Air Pollution		
EnE 251	Particulate Systems	3
ME 286	Combustion	3
ME 287	Fuels and Thermal Power	3
MSE 267	Surface Science	3
Solid and Hazardous Waste		
EnE 372	Hazardous Waste Management	3
EnE 382	Environmental Health Engineering	3
CE 318	Groundwater Flow and Contaminant Transport	3
CE 264	Geotechnical Engineering	3
Water and Wastewater		
EnE 210	Water Quality Control and Management	3
EnE 213	Biological Treatment Plant Design	3
EnE 214	Chemical Treatment Plant Design	3
EnE 215	Tertiary Treatment of Process Water	3
Electives		6
EnE 220	Environmental Engineering Laboratory II	3
ChE 233	Biochemical Reactor Design	3
EnE 298	Special Problems in Environmental Engineering	3
CE 236	Environmental Benefits and Costs in Civil Engineering Projects	3
CE 298	Special Problems in Civil Engineering	3
CE 315	Mathematical Modeling of Water Resources Systems	3
CE 316	Optimization and Simulation of Water Resources Systems	3
GmE 202	Principles of Remote Sensing	3
GmE 203	Principles of Geographic Information Systems	3
IE 230	Statistical Design and Analysis for Engineers	3
Geol 205	Geochemistry	3
Geol 274	Environmental Geology	3
Dissertation		12
EnE 400	Dissertation	12
Total Number of Units		57

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11.8 UNDERGRADUATE COURSE DESCRIPTIONS

Environmental Engineering (EnE)

EnE 31 Technology and Environment. Perspectives on ecology, energy and materials, population and socioeconomic factors; water quality; air quality; solid wastes and hazardous materials; environmental quality planning and management, and land use. Prereq: 3rd yr. standing. 3 u.

11.9 GRADUATE PROGRAMS COURSE DESCRIPTIONS

Environmental Engineering (EnE)

EnE 201 Introduction to Environmental Engineering. Pollution control laws, regulations and standards; types, sources and harmful effects of pollutants; measurement of pollution parameters. 3 u.

EnE 205 Environmental Engineering Laboratory I. Theory and methods for environmental (air, water, soil) quality parameter measurement and waste characterization. 3 u.

EnE 210 Water Quality Control and Management. Methods and economics of water quality control; river and estuary models for quality parameters; water quality management. Prereq: COI. 3 u.

EnE 213 Biological Treatment Plant Design. Theory of biological treatment processes and design of a treatment plant. Prereq: EnE 212/equiv. 3 u.

EnE 214 Chemical Treatment Process Design. Theory of chemical and physical treatment processes and design of treatment plants. Prereq: EnE 212/equiv. 3 u.

EnE 215 Tertiary Treatment of Process Water. Carbon adsorption; reverse osmosis; dialysis and electro dialysis; ion exchange; equipment design. Prereq EnE 212/equiv. 3 u.

EnE 220 Environmental Engineering Laboratory II. Experimental study and equipment design of certain pollution control operations and processes. Prereq: COI. 3 u.

EnE 250 Air Pollution. Nature, sources, effects and control of air pollutants; sampling and analysis; monitoring and meteorological factors. Prereq: COI. 3 u.

EnE 251 Particulate Systems. Dynamic properties of particulate systems; diffusion and coagulation of aerosol particles; electrical properties of particles; electrostatic precipitation. 3 u.

EnE 270 Solid Waste Disposal and Management. Composition and quantity of solid wastes generated by residential, commercial, and industrial establishments; disposal methods and management. Prereq: COI. 3 u.

EnE 280 Environmental Impact Assessment. Evaluation, estimation and prediction of the effects of structures, processes and systems upon the environment and the effects of environmental changes upon human population. Prereq: COI. 3 u.

EnE 296 Seminar. 1 u.; may be taken thrice.

EnE 298 Special Problems. 3 u.; may be taken twice.

EnE 300 Thesis. 6 u.

EnE 302 Chemical Processes in Environmental Engineering. Application of principles of chemical equilibrium, chemical kinetics and thermodynamics to air and water quality. Prereq: Chem16/ME 63/equiv. 3 u.

EnE 303 Biological Processes in Environmental Engineering. Application of the principles of biochemistry and microbiology to air and water quality, wastes and their engineering management; biologically mediated changes in water and in domestic and industrial wastewater. Prereq: EnE 212/213/equiv. 3 u.

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EnE 304 Numerical Solutions in Environmental Engineering. Mathematical formulation and solution of problems involving pollutant movements and behavior in environmental processes and air/water pollutant dynamics employing ordinary and partial differential equations and advanced mathematical methods in transport phenomena. Prereq: ES 201/equiv. 3 u.

EnE 305 Environmental Modeling. Application of mathematical programming and modeling of engineered solutions involving multi-media environmental systems such as air pollution, groundwater flow and solute transport, and surface water quality; stochastic models. Prereq: ES 204/equiv. 3 u.

EnE 372 Hazardous Waste Management. Sources and characteristics of hazardous wastes; concepts and applications of management of hazardous wastes from generation, treatment and disposal; waste minimization; remediation; environmental auditing and quantitative risk assessment. Prereq: EnE 270/EnE 302/equiv. 3 u.

EnE 382 Environmental Health Engineering. Biological, chemical and physical environmental stressors; impacts of environmental health hazards on people in the community and the workplace; prevention and mitigation of these impacts through behavioral and engineering control and health impact assessment. Prereq: EnE 210/EnE 280/equiv. 3 u.

EnE 400 Dissertation. 12 u.