

## **MINOR IN ENVIRONMENTAL MANAGEMENT: COURSE INFORMATION**

### **Introduction**

All NTU students except for those majoring in Civil and Environmental Engineering are eligible to offer and complete the **Minor in Environmental Management**. In addition, all NTU students except for those majoring in Environmental Engineering can also choose to register for the Minor courses to fulfil the General Education Requirements (GER) of their respective degree programmes.

The Asian environmental engineering industry is huge and rapidly growing. Paradoxically, while rapid urbanization and economic development have led to the widespread destruction of virgin forests and pollution of rivers and lakes, it is the countries with clean and well-managed environments that will continue to attract valuable investments to fuel economic growth. Sustainable economic development therefore dictates that environmental concerns must be properly addressed.

The Minor in Environmental Management is designed to expose students to a wide diversity of subjects on environmental management and planning. Students will be equipped with the essential knowledge and skills on various aspects of protecting and improving our precious land, air and water resources.

### **Requirements**

The Minor programme allows students the freedom to take charge of what they want to do. Students can set their own pace and design their own curriculum in a way that best meet their personal needs and aspirations. Students can choose from an initial offering of 7 different courses, worth 3 AUs each. These courses are listed below. The accompanying write-up on Course Descriptions provides more details about the courses.

EM101 Environmental Quality

EM103 Water Resources Management

EM104 Air Quality Management (mutually exclusive with CL454/CV4554 Air Pollution Control Engineering)

EM105 Energy Resources Management

EM106 Environmental Impact Assessment

EM107 Environmental Health and Safety

EM108 Urban Planning and Environment

To be awarded the Minor in Environmental Management, students will have to complete 15 AUs.

### **Note:**

The Minor subjects can also be used to fulfil the students' GER-UE (unrestricted electives) requirements. For example, if a student registers three of the EM subjects to fulfil their GER-UE requirements, he or she only needs to overload another 6AUs (or 2 more) of the EM subjects to complete the Minor programme..

### **Students Majoring in Civil Engineering**

Students in the Bachelor of Engineering (Civil) degree programme are allowed to take one or more of the following Minor subjects to fulfil the General Elective requirements of their degree programme:

EM104 Air Quality Management (GER-UE, mutually exclusive with CL454/CV4554 Air Pollution Control Engineering)

EM105 Energy Resources Management (GER-UE)

EM106 Environmental Impact Assessment (GER-UE)

EM107 Environmental Health and Safety (GER-UE)

EM108 Urban Planning and Environment (GER-UE)

### **Students Majoring in Bachelor of Science (Maritime Studies)**

Students in the Bachelor of Science (Maritime Studies) degree programme are allowed to offer and complete the Minor in Environmental Management. They can also choose to offer one or more of the Minor courses to fulfil the General Elective requirements of their degree programme. They are however not allowed to take EM101 to fulfil the Minor requirements as this subject is mutually exclusive with a BSc(MS) core subject (MT3302).

### **Students Majoring in Bachelor of Engineering (Environmental)**

Students in the Bachelor of Engineering (Environmental) degree programme are not allowed to complete the Minor in Environmental Management or take any subject in the Minor in Environmental Management.

### **Further Information**

Detailed information on the programme is available at the following website:

<http://www.ntu.edu.sg/cee>

For further enquiries, please contact:

Associate Prof Shuy Eng Ban

Email: [cshuyeb@ntu.edu.sg](mailto:cshuyeb@ntu.edu.sg)

Office No: 6790 5326

Mr. Tay Lye Chuan

Email: [clctay@ntu.edu.sg](mailto:clctay@ntu.edu.sg)

Office No: 6790 5262

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## **MINOR IN ENVIRONMENTAL MANAGEMENT: COURSE DESCRIPTIONS**

Lectures: 26 hr; Tutorials: 13 hr; Prerequisites: Nil; Academic Units: 3 (for all proposed modules)

### EM101 Environmental Quality

This is an introductory course on environmental engineering. Topics include ecological concepts, environmental engineering basics, and water, air, land and other environmental quality issues.

### EM103 Water Resources Management

This is an introductory course on water resources management. Topics include concepts in hydrology, storm water management, water quality, and water and wastewater treatment.

### EM104 Air Quality Management (mutually exclusive with CL454/CV4554 Air Pollution Control Engineering)

This is an introductory course on air quality management. Topics include the types of air pollutants, pollutant sampling and measurement devices, pollutant distributions and dispersal modes. Filtration concepts will be illustrated with reference to collection systems such as inertial devices, particulate scrubbers, electrostatic precipitators and air filters.

### EM105 Energy Resources Management

This introductory course provides an overview of energy resources management in the context of sustainable economic development. Topics include energy and human society, energy resources and reserves, supply, distribution, utilization, recovery and conversion, environmental impacts of energy utilization, energy economics and policies.

### EM106 Environmental Impact Assessment

Environment systems; direct and indirect impacts; impact assessment and analysis; planning tools; assessment methodologies; water, air, noise, social and economic impacts and planning issues; management of impacts; assessment indices and reports; environmental legislations.

### EM107 Environmental Health and Safety

Basic safety, health and environmental issues; legislations and regulations, exposure to toxic chemicals, biohazards, chemical hazards, noise, vectors and disease control, occupational health; air, water and noise control.

### EM108 Urban Planning and Environment

This course introduces how environmental considerations can be integrated into urban planning to build a sustainable green city. Topics include urban planning practices, strategic approaches addressing urban environmental issues including sanitation, water supply, wastewater treatment, solid waste management, land use control, air emissions, and noise control, as well as socio-economic issues including lower productivity, reduced income and quality of life.

## **MINOR IN ENVIRONMENTAL MANAGEMENT: FREQUENTLY ASKED QUESTIONS**

### **Q1 Why should I pursue a Minor in Environmental Management?**

Environmental issues are very pervasive and permeate all levels of society. Today's environmental problems are highly challenging and multidisciplinary in scope, and the Minor in Environmental Management will provide students with a good foundation in environmental management issues and perspectives. In addition, students will have exposure to the wide array of latest cutting-edge environmental technologies under development in School of CEE.

Students with a non-Environmental Engineering major will find the Minor in Environmental Management useful and pertinent, particularly when they embark on professional careers that may involve varying degrees of environmental-related interactions. NIE students and students who major in Communication Studies may be attracted to pursue the Minor in Environmental Management to strengthen their grasp and understanding of current affairs in the environmental arena. Entrepreneurial-minded students, perhaps from the Business School may be drawn to the Minor in Environmental Management as it will provide them with an inside track to identify and develop business opportunities in environmental technology. Students from the Biological and other Sciences may be interested in offering the Minor in Environmental Management to understand how science can impact our knowledge of the environment and affect the formulation of environment-related policies and standards. The Minor in Environmental Management is designed so that it will appeal to students from all disciplines.

### **Q2 How relevant is Environmental Management to society today?**

Singapore is fast becoming a major regional environmental engineering hub that is adding immense value to the economy through the rigorous creation of new businesses, products, services, capabilities and jobs. The Asian environmental engineering market is growing sturdily each year. Environmental issues affect all levels of society, including government ministries, public sector agencies, universities and research institutes, as well as multi-national corporations, industry players, environmental consultancies and service providers. Some important growth sectors include water and wastewater reclamation, membrane technologies, desalination, waste reclamation and resource recovery, clean energy, environmental biotechnology and environmental remediation.

### **Q3 What should I know about the staff teaching the Minor in Environmental Management?**

CEE has a highly experienced Environmental Engineering faculty, with many professors coming from world-renowned universities. Many faculty members come with extensive industry experience, having served with key environmental players in government and public sector agencies as well as with leading environmental firms and consultancies. CEE professors are also entrepreneurial, and have spun off successful companies based on academic R&D. CEE professors also have an established track record in environmental R&D, and have won prestigious awards for their research and development achievements.

### **Q4. Are there any prerequisites for the EM courses?**

No. The Minor in Environmental Management courses are designed to be broad-based to cater to the diverse needs of the NTU-wide student population.

Q5. Is there any order for the minor courses that I should take?

Students may take any five of the seven listed courses in any order.

Q6. Is there any differentiation between students who are interested in doing a Minor and those who will take one or two of the Minor subjects as General Electives? Will I be given priority if I am interested in doing a Minor?

The number of classes and vacancies will be tailored to meet the students' interest and demand for the Minor in Environmental Management courses. Because the Minor in Environmental Management requires students to complete 15 AUs within the duration of their degree programme, students who offer the Minor will be given preference during subject registration.