

## **B.Eng. (Environmental Engineering) Degree Requirements** **- Cohort AY2014/2015**

In order to graduate with the B.Eng. (Environmental Engineering) degree, students are required to:

- Complete a minimum of 162 MCs with a CAP  $\geq 2.0$
- 162 MCs will have to be earned by reading modules in accordance with Table A.
- The students are free to choose any combination of the offered modules from Table B to complete 12 MCs of the technical electives
- Satisfy all other requirements as prescribed by the Faculty or the University.

Students may opt for one of the following programs:

- Double Degree in Bachelor of Engineering (Civil) and Bachelor of Arts (Economics)
- Double Degree in Bachelor of Engineering (Civil) and Bachelor of Arts (Accountancy)
- Double Degree in Bachelor of Engineering (Civil) and Bachelor of Business Administration
- Double Degree with either Ecole Polytechnique (X) or Ecole Central Paris (ECP) or Ecole Nationale Supérieure des Mines de Paris (ENSMP) leading to Bachelor of Engineering (Civil), Diplôme d'Ingénieur and Master of Engineering or Master of Science.
- Dual Majors in Civil Engineering and various other disciplines. Please visit the following websites:

<http://bba.nus.edu/tech/htm> or [http://www.eng.nus.edu.sg/ugrad/SP\\_dm.html](http://www.eng.nus.edu.sg/ugrad/SP_dm.html) .

**Table A: Summary of Modular Requirements and Credits**

<b>MODULAR REQUIREMENTS</b>	<b>MCs</b>
<b>UNIVERSITY LEVEL REQUIREMENTS (ULRs)</b>	<b>20</b>
<b>PROGRAMME REQUIREMENTS</b>	
<b>Faculty Requirements:</b>	<b>10</b>
<i>ES2331 Communicating Engineering</i>	4
<i>HR2002 Human Capital in Organizations</i>	3
<i>EG2401 Engineering Professionalism</i>	3
<i>ES1102 English*</i>	-
<b>Major Requirements:</b>	
<b>Foundation Requirements</b>	<b>20</b>
<i>MA1505 Mathematics I</i>	4
<i>MA1506 Mathematics II</i>	4
<i>PC1431 Physics IE</i>	4
<i>CE2409 Computer Applications in Civil Engineering</i>	4
<i>CM1502 General and Physical Chemistry for Engineers</i>	4
<b>Basic Engineering Modules:</b>	<b>16</b>
<i>EG1109 Statics and Mechanics of Materials</i>	4
<i>CE2134 Hydraulics</i>	4
<i>CE2183 Construction Project Management</i>	4
<i>CE2407 Engineering and Uncertainty Analysis</i>	4
<b>Engineering Process/Infrastructure Engineering (3 of the following courses):</b>	<b>12</b>
<i>CE2155 Structural Mechanics and Materials</i>	4
<i>CE2112 Soil Mechanics</i>	4
<i>CE3132 Water Resources Engineering</i>	4
<i>CM2142 Analytical Chemistry</i>	4
<i>CN2121 Chemical Engineering Thermodynamics</i>	4
<i>AR2723 Strategies for Sustainable Architecture</i>	4
<i>LSM1401 Fundamentals of Biochemistry</i>	4
<b>Environmental Engineering Core Modules:</b>	<b>28</b>
<i>ESE1001 Environmental Engineering Fundamentals</i>	4
<i>ESE2001 Environmental Processes</i>	4
<i>ESE2401 Water Science &amp; Technology</i>	4
<i>ESE3101 Solid and Hazardous Waste Management</i>	4
<i>ESE3201 Air Quality Management</i>	4
<i>ESE3301 Environmental Microbiological Principles</i>	4
<i>ESE3401 Water &amp; Wastewater Engineering 1</i>	4
<b>ESE Technical Electives Modules (3)</b>	<b>12</b>
<b>Project Modules</b>	<b>12</b>
<i>ESE4501 Design Project</i>	4
<i>ESE4502R B.Eng. Dissertation</i>	8
<b>UNRESTRICTED ELECTIVE MODULES (UEMs)</b>	<b>20</b>
<b>INDUSTRIAL ENGAGEMENT</b>	<b>12</b>
<b>TOTAL</b>	<b>162</b>

Note: Students are required to read GEK1549 Critical Thinking and Writing towards the GEM requirement.

- For students who have not passed or been exempted from the Qualifying English Test at the time of admissions

## **Table B: Technical Elective Modules**<sup>Ω</sup>

### 1) Department of Civil and Environmental Engineering

- ESE4301 Wastewater Biotechnology
- ESE4401 Water & Wastewater Engineering 2
- ESE4403 Membrane Tech in Env Applns
- ESE4404 Bioenergy
- ESE4405 Urban Water Engineering & Management
- ESE4406 Energy and the Environment
- ESE4407 Environmental Forensics
- ESE4408 Environmental Impact Assessment
- ESE4409 Environmental Applications of Adsorption
- ESE5201 Combustion Pollution Control
- ESE5202 Air Pollution Control Technology
- ESE5203 Aerosol Science and Technology
- ESE5204 Toxic & Hazardous Waste Management
- ESE5205 Sludge and Solid Waste Management
- ESE5301 Environmental Biological Principles
- ESE5401 Water Quality Management
- ESE5402 Industrial Wastewater Control
- ESE5403 Water Reclamation & Reuse
- ESE5404 Biological Treatment Processes
- ESE5405 Water Treatment Processes
- ESE5406 Membrane Treatment Process and Modelling
- ESE5407 Membrane Technology for Water Management
- ESE5601 Environmental Risk Assessment
- ESE5602 Environmental Management Systems
- ESE5603 Pollution Minimisation and Prevention
- CE4247 Treatment Plant Hydraulics
- CE4231 Earth Climate: Science & Modelling
- CE5307 Wave Hydrodynamics and Physical Oceanography
- CE5603 Engineering Economics & Project Evaluation
- CE5883 Topics in Hydraulic & Water Resources<sup>+</sup>

<sup>Ω</sup> **CEE reserves the right to decide on the modules to be offered in an academic year & any given semester. Please confirm with department beforehand.**

<sup>+</sup> **depending on the topics covered.**

### 2) Dept of Chemical and Biomolecular Engineering

- SH5002 Fundamentals in Industrial Safety
- SH5110 Chemical Hazard Evaluation
- SH5101 Industrial Toxicology
- SH5402 Advanced SHE Management

### 3) Dept of School of Design and Environment

- LX5103 Environmental Law

**Proposed Recommended Semester Schedule for Environmental Engineering Students  
for A-Level & Equivalent for Cohort AY2014/2015**

Semester 1	MCs	Semester 2	MCs
MA1505 Mathematics I	4	MA1506 Mathematics II	4
PC1431 Physics IE	4	GEM (GEK 1549 Critical Thinking and	4
ESE1001 Environmental Engrg Fundamentals	4	CE2134 Hydraulics	4
CE2409 Computer Applns in Civil Engineering	4	CM1502 General and Physical Chem. for	4
EG1109 Statics and Mechanics of Materials	4	<i>CE2155 Structural Mechanics and Materials*</i>	1 x 4
<i>ES1102 English for Academic Purposes**</i>		<i>LSM1401 Fundamentals of Biochemistry*</i>	
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

\*\* Students who have not passed or been exempted from the Qualifying English Test at admissions have to read ES1000 and/or ES1102. This will be decided by CELC. Students who are required to read ES1102 have to pass the module before reading GEK1549.

Semester 3	MCs	Semester 4	MCs
<i>CE2112 Soil Mechanics*</i>	1 x 4	<i>CM2142 Analytical Chemistry*</i>	1 x 4
<i>CN2121 Chemical Engrg Thermodynamics*</i>		<i>LSM1401 Fundamentals of Biochemistry*</i>	
<i>LSM1401 Fundamentals of Biochemistry*</i>		<i>AR2723 Strategies for Sustainable Architecture*</i>	
<i>CM2142 Analytical Chemistry*</i>		<i>CE3132 Water Resources Engineering*</i>	
CE2183 Construction Project Management	4	ESE2401 Water Science & Technology	4
CE2407 Engineering and Uncertainty Analysis	4	GE/SS/Breadth Module	4
ESE2001 Environmental Processes	4	GE/SS/Breadth Module	4
ES2331 <b>Communicating Engineering (Fac.Req.)</b>	4	Unrestricted Elective Module 1	4
		Unrestricted Elective Module 2	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

\* Students are required to read 3 out of the 6 modules listed. LSM1401 and CM2142 are offered in both Semesters. Module choices are subjected to timetable availability and fulfillment of co/pre-requisites, if any.

Semester 5	MCs	Semester 6	MCs
ESE3101 Solid and Hazardous Waste Mgmt	4	Industrial Engagement (IE)	12
ESE3201 Air Quality Management	4	Unrestricted Elective Module 3	4
ESE3301 Envir. Microbiological Principles	4	Unrestricted Elective Module 4	4
ESE3401 Water & Wastewater Engineering 1	4		
Technical Elective Module 1	4		
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 7	MCs	Semester 8	MCs
ESE4501 Design Project	4	ESE4502R B.Eng. Dissertation (Cont'd)	4
ESE4502R B.Eng. Dissertation	4	HR2002 Human Capital in Organizations	3
GE/SS/Breadth Module	4	EG2401 Engineering Professionalism	3
Technical Elective Module 2	4	Unrestricted Elective Module 5	4
Technical Elective Module 3	4	GE/SS/Breath Module	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>18</b>

**Recommended Semester Schedule without Internship**  
(Cohort AY2014/2015)

Semester 3		Semester 4	
Modules	MCs	Modules	MCs
MA1301 Introductory Mathematics (UEM 4) <i>if exemption is given, will read MA1505</i>	4	MA1505 Mathematics I <i>if read MA1505 in Semester 1 then MA1506 now</i>	4
EG1109 Statics and Mechanics of Materials	4	ESE2401 Water Science and Technology	4
ESE1001 Environmental Engineering Fundamentals	4	CM1502 General and Physical Chemistry for Engineers **	4
ESE2001 Environmental Processes	4	GEK1549 Critical Thinking and Writing (GEM A)	4
PC1431 Physics IE **	4	Breadth	4
		UEM 5	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

**\*\* PC1431 or CM1502 will be exempted for those who have passed the APC Test for either one of the modules.**

Note: Students who have not passed or even been exempted from the Qualifying English Test at the time of admissions to the Faculty, will have to read ES100 and/or ES1102. This will be decided by CELC. GEK1549 must be read and it can be used to fulfil GEM A.

Semester 4		Semester 6	
Modules	MCs	Modules	MCs
MA1506 Mathematics II <i>if read MA1506 in previous semester, UEM now</i>	4	<b>CE2155* Structural Mechanics and Materials</b> (Pre-Req: EG1109)	<b>1 x 4</b>
ESE3401 Water and Wastewater Engineering 1	4	<b>AR2723* Strategies for Sustainable Architecture</b>	
<b>CE2112* Soil Mechanics</b> (Pre-Req: EG1109)	<b>1 x 4</b>	<b>CM2142* Analytical Chemistry</b> (Pre-Req: EVE waived if passed CM1502)	
<b>LSM1401* Fundamentals of Biochemistry</b>		<b>LSM1401* Fundamentals of Biochemistry</b>	
<b>CN2121* Chemical Engineering Thermodynamics</b> (Pre-Req: CN1111 and CM1502)		CE2134 Hydraulics	4
<b>CM2142* Analytical Chemistry</b> (Pre-Req: CM1101, waived if passed CM1502)		Technical Elective Module 1	4
CE2183 Construction Project Management	4	Free Elective module	4
Free Elective module	4	Free Elective module	4
Singapore Studies	4		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>20</b>

\* Students are required to read 3 out of 6 modules listed. LSM 1401 and CM 2142 are offered in both semesters. Module choices are subjected to timetable availability and fulfilment of co/pre-requisites, if any. For this recommended schedule, it is recommended to take 1 module per semester but you can take more for one semester if you choose to.

Semester 7		Semester 8	
Modules	MCs	Modules	MCs
ESE3101 Solid & Hazardous Waste Management	4	ESE4502 BEng Dissertation ( <i>continuation</i> )	4
ESE3201 Air Quality Management	4	<b>CE2155* Structural Mechanics and Materials</b> (Pre-Req: EG1109)	<b>1 x 4</b>
ESE3301 Environmental Microbiological Principles	4	<b>CE3132* Water Resources Engineering</b> (Pre-req: CE2134)	
ESE4501 Design Project	4	<b>AR2723* Strategies for Sustainable Architecture</b>	
ESE4502 BEng Dissertation	4	<b>CM2142* Analytical Chemistry</b> (Pre-Req: CM1101)	
CE2407 Engineering and Uncertainty Analysis	4	<b>LSM1401* Fundamentals of Biochemistry</b>	
		EG2401 Engineering Professionalism	3
		Technical Elective Module 2	4
		Technical Elective Module 3	4
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>19</b>

Note:

- 1) Polytechnic graduates admitted into BEng programmes with the 6-month (12MC) Industrial Attachment requirement, may take the 3-month internship (6MC via EG3602) and/or 'Free Elective' modules in lieu of the 12 MC for the Industrial Attachment.
- 2) Students can consider taking their Free Elective module/s during Special Term/s.

Polytechnic graduates who are admitted into B.Eng. (Environmental Engineering) programme will be eligible for the following exemptions:

Module	MCs	Remarks
GEM Module (1)	4	Please note that these exemptions are <b>NOT</b> guaranteed, but are subject to assessment of polytechnic diploma results.
Breadth Module (1)	4	
ES2331 Communicating Engineering	4	
HR2002 Understanding Human Relations in the New Economy	3	
CE2409 Computer Applications in Civil Engineering	4	
Unrestricted Elective Modules (3)	12	
PC1431 Physics IE	4	Students can opt to sit for APC tests to gain exemptions from either CM1502 or PC1431. Exemption for this module will ONLY be granted by passing of APC test.
CM1502 General and Physical Chemistry for Engineers	4	

**Limit on Level-1000 Modules**

Students should not read more than 60 MCs of Level-1000 modules towards their degree requirements (minimum of 160 MCs for graduation). For Polytechnic graduates, 12 MCs of the exempted UE modules will not count towards the 60 MCs limit on level-1000 modules.