

## **B.Eng. (Environmental Engineering) Degree Requirement** **- matriculating August 2018**

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

- Complete a minimum of 160 MCs with a CAP  $\geq$  2.0
- Pass the modules in accordance with **Table A**
- Pass Pathway technical elective modules.
- Students should not read more than 60 MCs of Level-1000 modules towards their degree requirements.
- Satisfy all other requirements as prescribed by the Faculty or the University

### **B.Eng. (Environmental) Degree Requirements**

<b>AY2018/2019 EVE Requirements</b>	
<b>General Education (GE)</b> (5 Modules, each of 4MCs) <ul style="list-style-type: none"> <li>• <u>H</u>uman and Cultures (GEH)</li> <li>• Quantitative <u>R</u>easoning (GER)</li> <li>• <u>T</u>hinking and Expression (GET)</li> <li>• <u>S</u>ingapore Studies (GES)</li> <li>• Asking <u>Q</u>uestions (GEQ)</li> </ul>	<b>20</b>
<b>Faculty Requirements</b>	<b>6</b>
ES1531 Critical Thinking and Writing <sup>1</sup>	4
EG2401A Engineering Professionalism (ES1xxx English <sup>2</sup> )	2
<b>Foundational Requirements</b>	<b>16</b>
PC1431 Physics IE	4
CE2409 Computer Applications in Civil Engineering	4
CM1502 General & Physical Chemistry for Engrs <sup>3</sup>	4
MA1511 Engineering Calculus	2
MA1512 Differential Equations for Engineering	2
<b>Basic Engineering Modules</b>	<b>16</b>
CE2134 Hydraulics	4
CE1101 Civil Engineering Principles & Practice	6
ESE1102 Principles & Practice in Infrastructure and Environment	6
<b>Engineering Process/ Infrastructure Engineering (2 of the following courses):</b>	<b>8</b>
CE2112 Soil Mechanics [Pre-requisite: CE1101]	4
CE2155 Structural Mechanics and Materials [Pre-requisite: CE1101]	4
CE3132 Water Resources Engineering [Pre-requisite: CE2134]	4
CN2121 Chemical Engineering Thermodynamics [Pre-requisites: CN1111 & CN1502]	4
LSM1401 Fundamentals of Biochemistry [Pre-requisite: GCE 'A' Level or H2 Chemistry or equivalent]	4
CE2183 Construction Project Management	4
AR2723 Strategies for Sustainable Architecture	4
<i>Continue next page</i>	

<b>Environmental Engineering Core Modules</b>	<b>28</b>
ESE1001 Environmental Engineering Fundamentals	4
ESE2001 Environmental Processes	4
ESE2401 Water Science & Technology	4
ESE3101 Solid and Hazardous Waste Management	4
ESE3201 Air Quality Management	4
ESE3301 Environmental Microbiological Principles	4
ESE3401 Water & Wastewater Engineering 1	4
<b>EVE Project &amp; Internship Modules</b>	<b>22</b>
ESE4501 Design Project	4
ESE4502R B.Eng. Dissertation	8
EG3611A Industrial Attachment <sup>3</sup>	10
<b>EVE Technical Electives</b>	<b>4</b>
<b>Pathway Elective Modules</b>	<b>8</b>
<b>Unrestricted Elective Modules</b>	<b>32</b>
<b>Total MCs:</b>	<b>160</b>

<sup>1</sup> BEng students are required to read ES1531 Critical Thinking & Writing. Alternatively, students can read ES1501X Academic Expository Writing. USP/UTRP/RVRC students should refer to their respective programmes for USP/UTRP/RVRC modules to be read in place of ES1531.

<sup>2</sup> Students who have not passed or been exempted from the Qualifying English Test at the time of admission to the Faculty will have to read ES1000 and/or ES1103. This will be decided by CELC. ES1000 carries zero (0) MCs but students will have to pass in order to graduate while ES1103 carries 4 MCs to be used to fulfil the UEMs.

For BEng students who are from direct poly intake and in the following special programmes: DDPs, CDPs, GEP & CSP, industrial attachment is optional and the modular credits for the industrial attachment will become 'Free Electives' i.e., Unrestricted Electives (UE).

<sup>3</sup> Pre-requisite of CM1502 is 'A' level pass in Chemistry or equivalent. Students must take the Bridging module, CM1417 Fundamentals of Chemistry, if you do not have the pre-requisite.

Please visit CEE website for more details <http://www.eng.nus.edu.sg/cee/> for details.

Information updated on **January 2019**

## **Technical Elective Modules\***

### 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  
ESE5003 Environmental Chemical Principles  
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  
ESE5601 Environmental Risk Assessment  
ESE5602 Environmental Management Systems  
ESE5603 Pollution Minimisation and Prevention  
CE3102 Engineering of Socio-Technical System  
CE5307 Wave Hydrodynamics and Physical Oceanography  
CE5310 Hydroinformatics  
CE5312 River Mechanics  
CE5603 Engineering Economics & Project Evaluation  
CE5804 Global Infrastructure Project Management  
CE5883A Topics in Hydraulic & Water Resources

\* CEE reserves the right to decide on the modules to be offered in any given semester.

### Dept of Chemical and Biomolecular Engineering

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

## Practicing Professional Pathway (PPP)

### Sample Semester Schedule for A-Level & Equivalent EVE students – Industrial Attachment in Sem 6

Semester 1	MCs	Semester 2	MCs
MA1511 Engineering Calculus	2	CM1502 General and Physical Chemistry for Engrs *	4
MA1512 Differential Equations for Engineering	2	ESE1102 Principles & Practice in Infrastructure and Environment	6
PC1431 Physics IE	4	ES1531 Critical Thinking and Writing	4
CE1101 Civil Engineering Principles & Practice	6	GET <sup>1</sup>	4
ESE1001 Environmental Engrg Fundamentals	4	GEH/GES <sup>1</sup>	4
GER1000 <sup>1</sup>	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>
Semester 3		Semester 4	
Engineering Process/Infrastructure Engineering Elective 2	4	ESE2401 Water Science & Technology	4
CE2409 Computer Applications in Civil Engineering	4	ESE3101 Solid and Hazardous Waste Mgmt	4
ESE2001 Environmental Processes	4	ESE3301 Environmental Microbiological Principles	4
CE2134 Hydraulics	4	UEM 1 <sup>2</sup>	4
GES/GEH <sup>1</sup>	4	GEQ <sup>1</sup>	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>
Semester 5		Semester 6	
Engineering Process/Infrastructure Engineering Elective 1	4	EG3611A Industrial Attachment	10
ESE3201 Air Quality Management	4		
ESE3401 Water & Wastewater Engineering 1	4		
UEM 2 <sup>2</sup>	4		
UEM 3 <sup>2</sup>	4		
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>10</b>
SPECIAL TERM (SUMMER HOLIDAYS)			
UEM 4 <sup>2</sup>	4		
UEM 5 <sup>2</sup>	4		
<b>Sub-total</b>	<b>8</b>		
Semester 7		Semester 8	
ESE4502R B.Eng. Dissertation	4	ESE4502R B.Eng. Dissertation	4
ESE4501 Design Project	4	Professional Development Module <sup>3</sup>	4
Professional Development Module <sup>3</sup>	4	UEM 8 <sup>2</sup>	4
UEM 6 <sup>2</sup>	4	UEM 7 <sup>2</sup>	4
Technical Elective	4	EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>18</b>
<b>TOTAL</b>			<b>160</b>

<sup>1</sup>Students are strongly encouraged to complete all the five GE modules latest by the end of Year 2.

<sup>2</sup>UEM can be read in any semester and can be any module out of your major requirements.

<sup>3</sup>PPP students will have to take 8 MCs of professional development electives to satisfy pathway requirements.

\* Students without chemistry fundamental, must have taken CM1417 and passed before you are allowed to take CM1502.

Please note that this semester schedule is only a sample, you can customized your own schedule taking into considerations the semester the modules are offered and the pre- and co-requisites of a module.

**Pre-allocated**

## Research-Focused Pathway (RfP)

### Sample Semester Schedule for A-Level & Equivalent EVE students – Industrial Attachment in Sem 6

Semester 1	MCs	Semester 2	MCs
MA1511 Engineering Calculus	2		
MA1512 Differential Equations for Engineering	2	CM1502 General and Physical Chemistry for Engrs*	4
PC1431 Physics IE	4	ESE1102 Principles & Practice in Infrastructure and Environment	6
CE1101 Civil Engineering Principles & Practice	6	ES1531 Critical Thinking and Writing	4
ESE1001 Environmental Engrg Fundamentals	4	UEM 1 <sup>2</sup>	4
GER1000 <sup>1</sup>	4	GEH <sup>1</sup>	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>
Semester 3		Semester 4	
Engineering Process/Infrastructure Engineering Elective 1	4	ESE2401 Water Science & Technology	4
CE2409 Computer Applications in Civil Engineering	4	ESE3101 Solid and Hazardous Waste Mgmt	4
ESE2001 Environmental Processes	4	GET <sup>1</sup>	4
CE2134 Hydraulics	4	ESE3301 Environmental Microbiological Principles	4
GE 4 <sup>1</sup>	4	GEQ <sup>1</sup>	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>
Semester 5		Semester 6	
ESE3201 Air Quality Management	4	EG3611a Industrial Attachment	10
ESE3401 Water & Wastewater Engineering 1	4		
Engineering Process/Infrastructure Engineering Elective 2	4		
UEM 2 <sup>2</sup>	4		
UEM 3 <sup>2</sup>	4		
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>10</b>
<b>SPECIAL TERM (SUMMER HOLIDAYS)</b>			
UEM 4 <sup>2</sup>	4		
UEM 5 <sup>2</sup>	4		
<b>Sub-total</b>	<b>8</b>		
Semester 7		Semester 8	
ESE4502R B.Eng. Dissertation	4	ESE4502R B.Eng. Dissertation	4
ESE4501 Design Project	4	Research Pathway Module <sup>3</sup>	4
Research Pathway Module <sup>3</sup>	4	UEM 8 <sup>2</sup>	4
UEM 6 <sup>2</sup>	4	UEM 7 <sup>2</sup>	4
Technical Elective	4	EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>18</b>
<b>TOTAL</b>			<b>160</b>

<sup>1</sup>Students are strongly encouraged to complete all the five GE modules latest by the end of Year 2.

<sup>2</sup>UEM can be read in any semester and can be any module out of your major requirements.

<sup>3</sup>RfP students will have to take 8 MCs of research development electives to satisfy pathway requirements.

\* Students without chemistry fundamental, must have taken CM1417 and passed before you are allowed to take CM1502.

Please note that this semester schedule is only a sample, you can customized your own schedule taking into considerations the semester the modules are offered and the pre- and co-requisites of a module.

# Innovation & Design Centric Programme (iDCP)

## Sample Semester Schedule for A-Level & Equivalent EVE students

Semester 1	MCs	Semester 2	MCs
MA1511 Engineering Calculus	2	CM1502 General and Physical Chemistry for Engrs *	4
MA1512 Differential Equations for Engineering	2	ESE1102 Principles & Practice in Infrastructure and Environment	6
PC1431 Physics IE	4	Engineering Process/ Infrastructure Engineering Elective 1	4
CE1101 Civil Engineering Principles & Practice	6	Group A module for 2 <sup>nd</sup> Major ( <b>UEM</b> )	4
ESE1001 Environmental Engrg Fundamentals	4	GE 2 <sup>1</sup>	4
GER1000 <sup>1</sup>	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>
Semester 3	Semester 4		
ES1531 Critical Thinking & Writing	4	ESE2401 Water Science & Technology	4
CE2409 Computer Applications in Civil Engineering	4	GEQ1000 <sup>1</sup>	4
ESE2001 Environmental Processes	4	ESE3101 Solid and Hazardous Waste Mgmt	4
CE2134 Hydraulics	4	EG3301R DCP project ( <b>UEM</b> )	6
Group 2 module for 2 <sup>nd</sup> Major ( <b>UEM</b> )	4	ESE3301 Environmental Microbiological Principles	4
(CFG1010 Roots & Wings – optional)	( 2 )		
<b>Sub-total</b>	<b>20 (22)</b>	<b>Sub-total</b>	<b>22</b>
SPECIAL TERM (SUMMER HOLIDAYS)			
EG3612 Vacation Internship Programme	6		
<b>Sub-total</b>	<b>6</b>		
Semester 5	Semester 6		
ESE3201 Air Quality Management	4	Innovation & Enterprise Elective 1 ( <b>UEM</b> )	4
GE 4 <sup>1</sup>	4	EVE Technical Elective 1	4
ESE3401 Water & Wastewater Engineering 1	4	EVE Technical Elective 2	4
EG3301R DCP Project ( <b>UEM</b> )	6	EVE Technical Elective 3	4
		GE 5 <sup>1</sup>	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>20</b>
Semester 7	Semester 8		
EG4301 DCP B.Eng. Dissertation	6	EG4301 DCP B.Eng. Dissertation	6
Engineering Process/Infrastructure Engineering Elective 2	4	Innovation & Enterprise Elective 3 ( <b>UEM</b> )	4
Innovation & Enterprise Elective 2 ( <b>UEM</b> )	4	EVE Technical Elective 4	4
		EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>14</b>	<b>Sub-total</b>	<b>16</b>
<b>Total</b>			<b>160 (162)</b>

<sup>1</sup>Students are strongly encouraged to complete all the five GE modules latest by the end of Year 2.

<sup>2</sup>UEM can be read in any semester and can be any module out of your major requirements.

\* Students without chemistry fundamental, must have taken CM1417 and passed before you are allowed to take CM1502.

Please note that this semester schedule is only a sample, you can customized your own schedule taking into considerations the semester the modules are offered and the pre- and co-requisites of a module.

### Accredited Poly Direct Entry EVE Students as of AY2018/2019

EXEMPTED MODULES		MCs
	Unrestricted Elective Module 1 ▪	4
	Unrestricted Elective Module 2 ▪	4
	Unrestricted Elective Module 3 ▪	4
	Unrestricted Elective Module 4 ▪	4
	Unrestricted Elective Module 5 ▪	4
ESE1001	Environmental Engineering Fundamentals *	4
ESE1102	Principles & Practice in Infrastructure and Environment *	6
CE2409	Computer Applications in Civil Engg. *	4
(PC1431)	Physics IE ( <i>if passed APC test</i> ) *	(4)
<b>Total</b>		<b>34 (38)</b>

- University Level Requirements
- ∨ Faculty Requirements
- \* Programme Requirements

Note:

- Polytechnic graduates admitted into BEng programmes with the 6-month (10 MC) Industrial Attachment requirement, may take the 3-month internship (6MC via EG3602) and/or 'Free Elective' modules in lieu of the 10 MC for the Industrial Attachment.
- Polytechnic graduates have to read MA1301 except those who have successfully completed all modules/courses in special Math programmes (such as the "Certificate in Engineering Mathematics", "Diploma Plus Programme in Advanced Engineering Mathematics" & etc.) offered by their respective Polytechnics. Students can send their certificates to FoE Undergraduate Office if they are exempted from MA1301, before registering for MA1301.
- Please submit your diploma's transcript to CEE Department for accessing if you have the chemistry fundamentals to take CM1502 in the 2<sup>nd</sup> semester. If you do not have the fundamentals, you must take the Bridging module, CM1417 Fundamentals of Chemistry in your 1<sup>st</sup> semester.
- 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.

### Sample Semester Schedule for Accredited Direct Poly Entry EVE students

Semester 3	MCs	Semester 4	MCs
MA1301 Introductory Mathematics	4	MA1511 Engineering Calculus	2
ESE2001 Environmental Processes	4	MA1512 Differential Equations for Engineering	2
PC1431 Physics IE	4	ESE2401 Water Science & Technology	4
CE1101 Civil Engineering Principles & Practice	6	CM1502 General and Physical Chemistry for Engrs	4
GER1000	4	ES1531 Critical Thinking and Writing	4
		GE 2	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>20</b>
Semester 5		Semester 6	
Engineering Process/Infrastructure Engineering Elective 1	4	ESE3101 Solid and Hazardous Waste Mgmt	4
Engineering Process/Infrastructure Engineering Elective 2	4	<del>ESE3201 Air Quality Management</del> ESE3301	4
ESE3401 Water and Wastewater Engineering 1	4	UEM 1 <sup>3</sup>	4
CE2134 Hydraulics	4	GE 4 [GEQ]	4
GE 3	4	GE 5	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>
<b>SPECIAL TERM (SUMMER HOLIDAYS)</b>			
Vacation Internship (VIP) {fulfil Free Elective}	6		
<b>Sub-total</b>	<b>6</b>		
Semester 7		Semester 8	
ESE4502R B.Eng. Dissertation	4	ESE4502R B. Eng. Dissertation	4
ESE4501 Design Project	4	Professional Development Module <sup>3</sup>	4
Technical Elective	4	Professional Development Module <sup>3</sup>	4
Free Elective Module <sup>2</sup>	4	EG2401A Engineering Professionalism	2
<del>ESE3301 Env. Microbiological Principles</del> ESE3201	4	UEM 2 <sup>3</sup>	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>18</b>
<b>TOTAL</b>			<b>126</b>

**126 + 34 = 160**

<sup>1</sup>MA1301 can be counted towards UEM. Students with the relevant Diploma Plus Certificate or Advanced Modules in Mathematics from Singapore Polytechnic or Ngee Ann Polytechnic could be waived from the requirement of taking MA1301.

<sup>2</sup>Free elective module can be read in any semester and can be any modules out of your major requirements.

<sup>3</sup>UEM can be read in any semester and can be any modules out of your major requirements.

These modules (GE, Free Electives) can be read in any semester

**Pre-allocated**