

**Bachelor of Engineering (Chemical Engineering)  
with Second Major in Innovation & Design**

**Cohort 2019/2020**

Modular Requirements	Modular Credits (MCs)
<b>University Level Requirements</b>	
<b>General education modules:</b>	
• Quantitative Reasoning (GER1000)	4
• Thinking & Expression (GET)	4
• Human Cultures (GEH)	4
• Singapore Studies (GES)	4
• Asking Questions (GEQ1000)	4
<b>Sub-total for University Level Requirements</b>	<b>20</b>
<b>Programme Requirements</b>	
<b>Faculty requirements:</b>	
• ES2531 Critical Thinking & Writing <sup>1</sup>	4
• EG2401A Engineering Professionalism	2
• ES1xxxx English <sup>2</sup>	-
<b>Foundation requirements (common core):</b>	
• CN1101A Chemical Engineering Principles & Practice I	4
• CN2102 Chemical Engineering Principles & Practice II	4
• MA1511 Engineering Calculus	2
• MA1512 Differential Equations for Engineering	2
• MA1513 Linear Algebra with Differential Equations	2
• CS1010E Programming Methodology	4
• EE2211 Introduction to Machine Learning	4
• EG1311 Design & Make	4
• IE2141 Systems Thinking & Dynamics	4
• MLE1010 Materials Engineering Principles & Practice	4
<b>CHE core modules:</b>	
• CN2101 Material & Energy Balances	3
• CN2116 Chemical Kinetics & Reactor Design	4
• CN2121 Chemical Engineering Thermodynamics	4
• CN2122 Fluid Mechanics	4
• CN2125 Heat & Mass Transfer	4
• CN3101A Chemical Engineering Lab	4
• CN3121 Process Dynamics & Control	4
• CN3124 Fluid-Particle Systems	4
• CN3132 Separation Processes	4
• CN3135 Process Safety, Health & Environment	3
• CN3421A Process Modelling & Numerical Simulation	3
• CN4122 Process Synthesis & Simulation	3
<b>CHE technical electives <sup>3</sup></b>	<b>0</b>
<b>CHE design and project modules:</b>	
• CN4123R Final Year Design Project	6
• EG3301R DCP Project (over 2 consecutive semesters) <i>(Double-counted for Second Major in Innovation &amp; Design)</i>	12
<b>EG3612 Vacation Internship Programme (VIP) <sup>3,4</sup></b>	<b>6</b>
<b>Sub-total for Programme Requirements</b>	<b>108</b>

**Innovation & Design Programme  
Faculty of Engineering**

<b>Unrestricted Elective Modules (UEM)</b>	
• Group A module for Second Major	4
• Group B module for Second Major	4
• Group C modules for Second Major – Innovation & Enterprise electives	8
• EG4301 DCP Dissertation <u>or</u> EG4301A Ideas to Start-up (over 2 consecutive semesters)	12
Other unrestricted electives	4
<b>Sub-total for Unrestricted Elective Modules</b>	<b>32</b>
<b>Total</b>	<b>160</b>

Notes:

- <sup>1</sup> Students in USP, UTCP, and RVRC may read an equivalent module (e.g. UWC2101%, UTW1001%, ES1601, ES1501%) in lieu of ES2531.
- <sup>2</sup> Students who have not passed or been exempted from the Qualifying English Test at the point of admission will have to read ES1000 and/or ES1103. ES1103 carries 4 MCs which may be counted as UEM.
- <sup>3</sup> Students in this Second Major are allowed to complete EG3612 (6 MCs) in lieu of EG3611A (10 MCs).  
  
The 12 MCs for EG3301R are mapped by 4 MCs from the replacement of EG3611A (10 MCs) with EG3612 (6 MCs) and 8 MCs from technical electives.  
  
Students may also opt to do EG3611A (10 MCs) in lieu of EG3612 (6 MCs).
- <sup>4</sup> EG3612 (VIP) is optional for poly-intake students and those in the following special programmes: double degree programmes (DDP), concurrent degree programmes (CDP), Chemical Sciences Programme (CSP), and E-Scholars. The 6 MCs for EG3612 may be replaced by other modules.

**Recommended semester schedule for Cohort 2019/2020 – JC-intake students or equivalent**  
(for students who opt for vacation internship)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles & Practice I	4	CN2101 Material & Energy Balances	3
MA1511 Engineering Calculus	2	CN2102 Chemical Engineering Principles & Practice II	4
MA1512 Differential Equations for Engineering	2	MA1513 Linear Algebra with Differential Equations	2
EG1311 Design & Make	4	CS1010E Programming Methodology	4
GER1000 Quantitative Reasoning	4	MLE1010 Materials Engineering Principles & Practice	4
GET	4	<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>21</b>

Semester 3	MCs	Semester 4	MCs
IE2141 Systems Thinking & Dynamics	4	EE2211 Introduction to Machine Learning	4
CN2121 Chemical Engineering Thermodynamics	4	CN2116 Chemical Kinetics & Reactor Design	4
CN2122 Fluid Mechanics	4	CN2125 Heat & Mass Transfer	4
GEQ1000 Asking Questions	4	CN3124 Fluid-Particle Systems	4
ES2531 Critical Thinking & Writing	4	EG2401A Engineering Professionalism	2
<b>Group B module for Second Major (UEM)</b>	<b>4</b>	<b>EG3301R DCP Project</b>	<b>6</b>
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>24</b>

Summer vacation between Semesters 4 and 5	MCs
EG3612 Vacation Internship Programme	6
<b>Sub-total</b>	<b>6</b>

Semester 5	MCs	Semester 6	MCs
<b>EG3301R DCP Project</b>	<b>6</b>	<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>
CN3101A Chemical Engineering Lab	4	<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>
CN3121 Process Dynamics & Control	4	CN4122 Process Synthesis & Simulation	3
CN3132 Separation Processes	4	GES	4
		GEH	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>19</b>

Semester 7	MCs	Semester 8	MCs
<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>	<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>
CN3135 Process Safety, Health & Environment	3	CN4123R Final Year Design Project	6
CN3421A Process Modelling & Numerical Simulation	3		
UEM	4		
<b>Sub-total</b>	<b>16</b>	<b>Sub-total</b>	<b>12</b>

**Innovation & Design Programme  
Faculty of Engineering**

**Recommended semester schedule for Cohort 2019/2020 – JC-intake students or equivalent**  
(for students who opt for industrial attachment in lieu of vacation internship)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles & Practice I	4	CN2101 Material & Energy Balances	3
MA1511 Engineering Calculus	2	CN2102 Chemical Engineering Principles & Practice II	4
MA1512 Differential Equations for Engineering	2	MA1513 Linear Algebra with Differential Equations	2
EG1311 Design & Make	4	CS1010E Programming Methodology	4
GER1000 Quantitative Reasoning	4	MLE1010 Materials Engineering Principles & Practice	4
GET	4	<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>21</b>

Semester 3	MCs	Semester 4	MCs
IE2141 Systems Thinking & Dynamics	4	EE2211 Introduction to Machine Learning	4
CN2121 Chemical Engineering Thermodynamics	4	CN2116 Chemical Kinetics & Reactor Design	4
CN2122 Fluid Mechanics	4	CN2125 Heat & Mass Transfer	4
GEQ1000 Asking Questions	4	CN3124 Fluid-Particle Systems	4
ES2531 Critical Thinking & Writing	4	EG2401A Engineering Professionalism	2
<b>Group B module for Second Major (UEM)</b>	<b>4</b>	<b>EG3301R DCP Project</b>	<b>6</b>
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>24</b>

Semester 5	MCs	Semester 6	MCs
<b>EG3301R DCP Project</b>	<b>6</b>	EG3611A Industrial Attachment	10
CN3101A Chemical Engineering Lab	4		
CN3121 Process Dynamics & Control	4		
CN3132 Separation Processes	4		
GEH	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	MCs	Semester 8	MCs
<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>	<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>
<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>	<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>
CN3135 Process Safety, Health & Environment	3	CN4123R Final Year Design Project	6
CN3421A Process Modelling & Numerical Simulation	3	UEM	4
CN4122 Process Synthesis & Simulation	3		
GES	4		
<b>Sub-total</b>	<b>23</b>	<b>Sub-total</b>	<b>20</b>

**Recommended semester schedule for Cohort 2019/2020 – JC-intake students or equivalent**  
(for students in year-long NOC programmes)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles & Practice I	4	CN2101 Material & Energy Balances	3
MA1511 Engineering Calculus	2	CN2102 Chemical Engineering Principles & Practice II	4
MA1512 Differential Equations for Engineering	2	MA1513 Linear Algebra with Differential Equations	2
EG1311 Design & Make	4	CS1010E Programming Methodology	4
GER1000 Quantitative Reasoning	4	MLE1010 Materials Engineering Principles & Practice	4
GET	4	<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>21</b>

Semester 3	MCs	Semester 4	MCs
IE2141 Systems Thinking & Dynamics	4	EE2211 Introduction to Machine Learning	4
CN2121 Chemical Engineering Thermodynamics	4	CN2116 Chemical Kinetics & Reactor Design	4
CN2122 Fluid Mechanics	4	CN2125 Heat & Mass Transfer	4
GEQ1000 Asking Questions	4	CN3124 Fluid-Particle Systems	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project	6
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project	6	NOC	
CN3101A Chemical Engineering Lab	4		
CN3121 Process Dynamics & Control	4		
CN3132 Separation Processes	4		
CN4122 Process Synthesis & Simulation	3		
<b>Sub-total</b>	<b>21</b>	<b>Sub-total</b>	

Semester 7	MCs	Semester 8	MCs
NOC		CN3135 Process Safety, Health & Environment	3
		CN3421A Process Modelling & Numerical Simulation	3
		CN4123R Final Year Design Project	6
		GEH	4
		GES	4
<b>Sub-total</b>		<b>Sub-total</b>	<b>20</b>

Mapping of year-long NOC programmes:

NOC modules	iDP / Engineering modules
TR3201 Entrepreneurship Practicum (8 MCs)	EG2401A Engineering Professionalism (2 MCs) + UEM (6 MCs)
TR3202 Start-up Internship Programme (12 MCs)	EG3612 Vacation Internship Programme (6 MCs) + EG4301 DCP Dissertation (4 MCs out of 12 MCs)
TR3203N Start-up Case Study & Analysis (8 MCs)	EG4301 DCP Dissertation (8 MCs out of 12 MCs)
Entrepreneurship courses (up to 12 MCs)	Innovation & Enterprise electives (8 MCs – UEM)

**Recommended semester schedule for Cohort 2019/2020 – poly-intake students**

(for students who intend to complete in 6 semesters and are exempted from Group A module for Second Major)

Semester 3	MCs	Semester 4	MCs
MA1301 Introductory Mathematics (UEM in lieu of EG3612)	4	EG3301R DCP Project	6
GER1000 Quantitative Reasoning	4	MA1511 Engineering Calculus	2
GET	4	MA1512 Differential Equations for Engineering	2
GEH	4	CS1010E Programming Methodology	4
Group B module for Second Major (UEM)	4	GEQ1000 Asking Questions	4
		GES	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project	6	Innovation & Enterprise Elective 1 (UEM)	4
MA1513 Linear Algebra with Differential Equations	2	EE2211 Introduction to Machine Learning	4
IE2141 Systems Thinking & Dynamics	4	CN2116 Chemical Kinetics & Reactor Design	4
CN2121 Chemical Engineering Thermodynamics	4	CN2125 Heat & Mass Transfer	4
CN2122 Fluid Mechanics	4	CN3124 Fluid-Particle Systems	4
ES2531 Critical Thinking & Writing	4	CN3135 Process Safety, Health & Environment	3
		EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>25</b>

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
CN3101A Chemical Engineering Lab	4	Innovation & Enterprise Elective 2 (UEM)	4
CN3121 Process Dynamics & Control	4	CN3421A Process Modelling & Numerical Simulation	3
CN3132 Separation Processes	4	CN4123R Final Year Design Project	6
CN4122 Process Synthesis & Simulation	3	UEM (in lieu of EG3612)	2
<b>Sub-total</b>	<b>21</b>	<b>Sub-total</b>	<b>21</b>

Notes:

- Poly-intake students may receive the following exemptions depending on their Diploma qualification:
  - CN1101A Chemical Engineering Principles & Practice I (4 MCs)
  - CN2101 Material & Energy Balances (3 MCs)
  - CN2102 Chemical Engineering Principles & Practice II (4 MCs)
  - MLE1010 Materials Engineering Principles & Practice (4 MCs)
  - EG1311 Design & Make (4 MCs)
  - Unrestricted elective modules (20 MCs)
- Poly-intake students may be exempted from Group A module for Second Major (4 MCs) and/or one Innovation & Enterprise elective (4 MCs) depending on their Diploma qualification. These would be included as part of the 20 MCs of exemptions for unrestricted elective modules.
- EG3612 (VIP) is not compulsory for poly-intake students. The 6 MCs for VIP may be fulfilled by MA1301 (4 MCs) and/or other modules.