

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

Cohort 2020/2021

Modular Requirements	Modular Credits (MCs)
University Level Requirements	
General education modules:	
• Quantitative Reasoning (GER1000)	4
• Thinking & Expression (GET)	4
• Human Cultures (GEH)	4
• Singapore Studies (GES)	4
• Asking Questions (GEQ1000)	4
Sub-total for University Level Requirements	20
Programme Requirements	
Faculty requirements:	
• ES2531 Critical Thinking & Writing ¹	4
• EG2401A Engineering Professionalism	2
• ES1xxxx English ²	-
Foundation requirements (common core):	
• IE1111R Industrial & Systems Engineering Principles & Practice I	4
• IE2111 Industrial & Systems Engineering Principles & Practice II	4
• MA1505 Mathematics I	4
• MA1508E Linear Algebra for Engineers	4
• 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
ISE core modules:	
• IE2100 Probability Models with Applications	4
• IE2110 Operations Research I	4
• IE3101 Statistics for Engineering Applications	4
• IE3110R Simulation	4
• IE4211 Modelling & Analytics	4
• IE4240 Project Management	4
• ST2334 Probability & Statistics	4
• PC1431 Physics IE <u>or</u> PC1432 Physics IIE	4
ISE technical electives ³	16
ISE design and project modules:	
• EG3301R DCP Project (over 2 consecutive semesters) <i>(Double-counted for Second Major in Innovation & Design and replaces IE3100R Systems Design Project & IE4102 Independent Study Module)</i>	12
EG3612 Vacation Internship Programme (VIP) ^{3,4}	6
Sub-total for Programme Requirements	108
Unrestricted Elective Modules (UEM)	
• 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
Sub-total for Unrestricted Elective Modules	32
Total	160

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Notes:

- ¹ Students in USP, UTCP, and RVRC may read an equivalent module (e.g. UWC2101%, UTW1001%, ES1601, ES1501%) in lieu of ES2531.
- ² 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.
- ³ Students may opt to do EG3611A (10 MCs) in lieu of EG3612 (6 MCs) and 4 MCs of technical electives.
- ⁴ 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 2020/2021 – JC-intake students or equivalent
(for students who opt for vacation internship)

Semester 1	MCs	Semester 2	MCs
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice I	4
MA1505 Mathematics I	4	MA1508E Linear Algebra for Engineers	4
CS1010E Programming Methodology	4	MLE1010 Materials Engineering Principles & Practice	4
PC1431 Physics IE <u>or</u> PC1432 Physic IIE	4	ST2334 Probability & Statistics	4
GEQ1000 Asking Questions	4	GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
EG1311 Design & Make	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	IE2100 Probability Models with Applications	4
IE2110 Operations Research I	4	GET	4
IE3101 Statistics for Engineering Applications	4	EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces IE3100R and IE4102)	6
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	20

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

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces IE3100R and IE4102)	6	Innovation & Enterprise Elective 1 (UEM)	4
IE3110R Simulation	4	IE4211 Modelling & Analytics	4
IE4240 Project Management	4	Technical Elective 1	4
GEH	4	Technical Elective 2	4
		GES	4
Sub-total	18	Sub-total	20

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 2 (UEM)	4	Technical Elective 4	4
Technical Elective 3	4	UEM	4
Sub-total	14	Sub-total	14

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Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent
(for students who opt for industrial attachment in lieu of vacation internship)

Semester 1	MCs	Semester 2	MCs
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice I	4
MA1505 Mathematics I	4	MA1508E Linear Algebra for Engineers	4
CS1010E Programming Methodology	4	MLE1010 Materials Engineering Principles & Practice	4
PC1431 Physics IE <u>or</u> PC1432 Physic IIE	4	ST2334 Probability & Statistics	4
GEQ1000 Asking Questions	4	GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
EG1311 Design & Make	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	IE2100 Probability Models with Applications	4
IE2110 Operations Research I	4	GET	4
IE3101 Statistics for Engineering Applications	4	EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces IE3100R and IE4102)	6
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	20

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces IE3100R and IE4102)	6	EG3611A Industrial Attachment	10
IE3110R Simulation	4		
IE4240 Project Management	4		
GEH	4		
GES	4		
Sub-total	22	Sub-total	10

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 1 (UEM)	4	IE4211 Modelling & Analytics	4
Innovation & Enterprise Elective 2 (UEM)	4	Technical Elective 3	4
Technical Elective 1	4	UEM	4
Technical Elective 2	4		
Sub-total	22	Sub-total	18

**Innovation & Design Programme
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Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent
(for students in year-long NOC programmes)

Semester 1	MCs	Semester 2	MCs
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice I	4
MA1505 Mathematics I	4	MA1508E Linear Algebra for Engineers	4
CS1010E Programming Methodology	4	MLE1010 Materials Engineering Principles & Practice	4
PC1431 Physics IE <u>or</u> PC1432 Physic IIE	4	ST2334 Probability & Statistics	4
GEQ1000 Asking Questions	4	GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
EG1311 Design & Make	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	IE2100 Probability Models with Applications	4
IE2110 Operations Research I	4	GET	4
IE3101 Statistics for Engineering Applications	4	GEH	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces IE3100R and IE4102)	6
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces IE3100R and IE4102)	6	NOC	
IE3110R Simulation	4		
IE4240 Project Management	4		
GES	4		
Sub-total	18	Sub-total	

Semester 7	MCs	Semester 8	MCs
NOC		IE4211 Modelling & Analytics	4
		Technical Elective 1	4
		Technical Elective 2	4
		Technical Elective 3	4
Sub-total		Sub-total	16

Mapping of year-long NOC programmes:

NOC modules	iDP / Engineering modules
TR3201 Entrepreneurship Practicum (8 MCs)	EG2401A Engineering Professionalism (2 MCs) + IE4249 (4 MCs – TE)
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 2020/2021 – poly-intake students or equivalent

Semester 3	MCs	Semester 4	MCs
MA1301 Introductory Mathematics (UEM in lieu of EG3612)	4	EG3301R DCP Project (replaces IE3100R and IE4102)	6
CS1010E Programming Methodology	4	IE2111 Industrial & Systems Engineering Principles & Practice I	4
PC1431 Physics IE or PC1432 Physic IIE	4	MA1505 Mathematics I	4
GEQ1000 Asking Questions	4	MLE1010 Materials Engineering Principles & Practice	4
Group B module for Second Major (UEM)	4	ST2334 Probability & Statistics	4
		GER1000 Quantitative Reasoning	4
Sub-total	20	Sub-total	26

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces IE3100R and IE4102)	6	IE2141 Systems Thinking & Dynamics	4
MA1508E Linear Algebra for Engineers	4	IE2100 Probability Models with Applications	4
EG1311 Design & Make	4	GEH	4
EE2211 Introduction to Machine Learning	4	GET	4
IE2110 Operations Research I	4	EG2401A Engineering Professionalism	2
		Group A module for Second Major (UEM)	4
Sub-total	22	Sub-total	22

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 1 (UEM)	4	Innovation & Enterprise Elective 2 (UEM)	4
IE3101 Statistics for Engineering Applications	4	IE4211 Modelling & Analytics	4
IE3110R Simulation	4	Technical Elective 1	4
IE4240 Project Management	4	GES	4
Sub-total	22	Sub-total	22

Semester 9	MCs
Technical Elective 2	4
Technical Elective 3	4
Technical Elective 4	4
UEM (in lieu of EG3612)	2
Sub-total	14

Notes:

- Poly-intake students may receive the following exemptions depending on their Diploma qualification:
 - IE1111R Industrial & Systems Engineering Principles & Practice I (4 MCs)
 - ES2531 Critical Thinking & Writing (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.