

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

Cohorts AY2021/2022 and AY2022/2023

Modular Requirements	Modular Credits (MCs)
Common Curriculum	
GEA1000 Quantitative Reasoning with Data ¹	4
CS1010E Programming Methodology	4
ES2631 Critique and Communication of Thinking and Design ¹	4
GE: Cultures and Connections ¹	4
GE: Singapore Studies ¹	4
GE: Communities and Engagement ¹	4
CDE2000 Creating Narratives	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning	4
EG1311 Design and Make	4
EG2501 Liveable Cities	4
IE2141 Systems Thinking and Dynamics	4
PF1101 Project Management	4
EG4301 DCP Dissertation or EG4301A Ideas to Start-up (over 2 consecutive semesters) ²	8
Sub-total for Common Curriculum	60
Engineering Core	
MA1511 Engineering Calculus	2
MA1512 Differential Equations for Engineering	2
MA1513 Linear Algebra with Differential Equations	2
CE2407A Uncertainty Analysis for Engineers	2
EG2401A Engineering Professionalism	2
EG3611A Industrial Attachment or CFG2101 NUS Vacation Internship Programme ³ and EG3612 Vacation Industrial Attachment	10
Sub-total for Engineering Core	20
Engineering Programme Requirements	
CN1101A Chemical Engineering Principles and Practice I	4
CN2102 Chemical Engineering Principles and Practice II	4
CN2103 Mass and Energy Balance	4
CN2104 Chemical Engineering Thermodynamics	4
CN2105 Reaction Engineering	4
CN2106 Fluid Mechanics and Heat Transfer	4
CN3103 Mass Transfer and Separation Processes	4
CN3104 Computer-Aided Chemical Process Simulation	4
CN4101 Process Control and Safety	4
CN4102 Chemical Engineering Lab	4
Sub-total for Engineering Programme Requirements	40
Unrestricted Electives	
Group A module for Second Major	4
Group B module for Second Major	4
Group C modules for Second Major (Innovation & Enterprise electives)	8
EG3301R DCP Project (over 2 consecutive semesters)	12
EG4301 DCP Dissertation or EG4301A Ideas to Start-up (over 2 consecutive semesters) ²	4

Innovation & Design Programme
NUS College of Design and Engineering

Other unrestricted electives	8
Sub-total for Unrestricted Electives	40
Total	160

Notes:

- ¹ Students may read equivalent modules in USP, UTCP, and RVRC.
- ² The 12 MCs for EG4301/EG4301A are counted towards 8 MCs for the Integrated Project requirement in the Common Curriculum while 4 MCs are counted as unrestricted elective.
- ³ May be replaced by EG2605 Undergraduate Research Opportunities Programme.

Recommended semester schedule – JC-intake students or equivalent
(for students who opt for vacation internships)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
Sub-total	20	Sub-total	20

Summer vacation between Semesters 2 and 3	MCs
CFG2101 NUS Vacation Internship Programme	4
Sub-total	4

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
Sub-total	20	Sub-total	22

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

Semester 5	MCs	Semester 6 – can be used for SEP	MCs
EG3301R DCP Project	6	Innovation & Enterprise Elective 1	4
CN3103 Mass Transfer and Separation Processes	4	GE *	4
CN3104 Computer-Aided Chemical Process Simulation	4	GE *	4
EG2401A Engineering Professionalism	2	GE *	4
CDE2000 Creating Narratives	4	UE	4
Sub-total	20	Sub-total	20

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
CN4101 Process Control and Safety	4	Innovation & Enterprise Elective 2	4
UE	4	CN4102 Chemical Engineering Lab	4
Sub-total	14	Sub-total	14

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these modules earlier.

Recommended semester schedule – JC-intake students or equivalent
(for students who opt for vacation internships **plus a specialisation**)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
Sub-total	20	Sub-total	20

Summer vacation between Semesters 2 and 3	MCs
CFG2101 NUS Vacation Internship Programme	4
Sub-total	4

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
Sub-total	20	Sub-total	22

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

Semester 5	MCs	Semester 6 – can be used for SEP	MCs
EG3301R DCP Project	6	Innovation & Enterprise Elective 1	4
CN3103 Mass Transfer and Separation Processes	4	GE *	4
CN3104 Computer-Aided Chemical Process Simulation	4	GE *	4
EG2401A Engineering Professionalism	2	GE *	4
CDE2000 Creating Narratives	4	Specialisation module 1	4
Sub-total	20	Sub-total	20

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
CN4101 Process Control and Safety	4	Innovation & Enterprise Elective 2	4
Specialisation module 2	4	CN4102 Chemical Engineering Lab	4
Specialisation module 3	4	Specialisation module 5	4
Specialisation module 4	4		
Sub-total	22	Sub-total	18

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these modules earlier.

Recommended semester schedule – JC-intake students or equivalent
(for students who opt for industrial attachment)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project	6	EG3611A Industrial Attachment	10
CN3103 Mass Transfer and Separation Processes	4		
CN3104 Computer-Aided Chemical Process Simulation	4		
EG2401A Engineering Professionalism	2		
CDE2000 Creating Narratives	4		
GE *	4		
Sub-total	24	Sub-total	10

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
CN4101 Process Control and Safety	4	CN4102 Chemical Engineering Lab	4
GE *	4	UE	4
GE *	4	UE	4
Sub-total	22	Sub-total	22

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these modules earlier.

Recommended semester schedule – JC-intake students or equivalent
(for students who opt for industrial attachment **plus a specialisation**)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
		GE	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
GE	4		
Sub-total	24	Sub-total	22

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project	6	EG3611A Industrial Attachment	10
CN3103 Mass Transfer and Separation Processes	4	Specialisation module 1	4
CN3104 Computer-Aided Chemical Process Simulation	4		
EG2401A Engineering Professionalism	2		
CDE2000 Creating Narratives	4		
GE *	4		
Sub-total	24	Sub-total	14

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
CN4101 Process Control and Safety	4	CN4102 Chemical Engineering Lab	4
Specialisation module 2	4	Specialisation module 4	4
Specialisation module 3	4	Specialisation module 5	4
Sub-total	22	Sub-total	22

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear this module earlier.

Recommended semester schedule – JC-intake students or equivalent
(for students in year-long NOC programmes)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6 – NOC	MCs
EG3301R DCP Project	6	NOC	
CN3103 Mass Transfer and Separation Processes	4		
CN3104 Computer-Aided Chemical Process Simulation	4		
CDE2000 Creating Narratives	4		
GE *	4		
Sub-total	22	Sub-total	20

Semester 7 – NOC	MCs	Semester 8	MCs
NOC		CN4101 Process Control and Safety	4
		CN4102 Chemical Engineering Lab	4
		GE *	4
		GE *	4
Sub-total	20	Sub-total	16

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these modules earlier.

A year-long NOC programme comprises the following modules:

- TR3201N Entrepreneurship Practicum (8 MCs) – replaces EG4301A (4 MCs out of 12 MCs) and UE (4 MCs)
- TR3202N Start-up Internship Programme (12 MCs) – replaces EG3611A (10 MCs) and EG2401A (2 MCs)
- TR3203N Start-up Case Study and Analysis (8 MCs) – replaces EG4301A (8 MCs out of 12 MCs)
- Entrepreneurship courses (up to 12 MCs) – replaces Innovation & Enterprise electives (up to 8 MCs) while the rest are counted as UE

Recommended semester schedule – JC-intake students or equivalent
(for students in one-semester NOC programmes)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	Group A module for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
Group B module for Second Major	4	EG3301R DCP Project	6
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6 – NOC	MCs
EG3301R DCP Project	6	NOC	
CN3103 Mass Transfer and Separation Processes	4		
CN3104 Computer-Aided Chemical Process Simulation	4		
CDE2000 Creating Narratives	4		
GE *	4		
Sub-total	22	Sub-total	20

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
CN4101 Process Control and Safety	4	CN4102 Chemical Engineering Lab	4
GE *	4	UE	4
GE *	4	UE	4
Sub-total	18	Sub-total	18

* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these modules earlier.

A one-semester NOC programme comprises the following modules:

- TR3202S Start-up Internship Programme (12 MCs) – replaces EG3611A (10 MCs) and EG2401A (2 MCs)
- TR3204 Entrepreneurship Practicum (4 MCs) – replaces Innovation & Enterprise Elective 1
- Entrepreneurship course (4 MCs) – replaces Innovation & Enterprise Elective 2

Recommended semester schedule – JC-intake students or equivalent
(for students in Engineering Scholars Programme)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CN2103 Mass & Energy Balance	4
DTK1234 Design Thinking	4	CN2104 Chemical Engineering Thermodynamics	4
MA1513 Linear Algebra with Differential Equations	2	MA1512 Differential Equations for Engineering	2
CE2407A Uncertainty Analysis for Engineers	2	RC4 module 2 (replaces GE)	4
PF1101 Fundamentals of Project Management	4	EG3301R DCP Project	6
RC4 module 1 (replaces GE)	4	Group A module for Second Major	4
Sub-total	24	Sub-total	28

Semester 3	MCs	Semester 4 – NOC	MCs
CN2105 Reaction Engineering	4	NOC	
EE2211 Introduction to Machine Learning	4		
EG2501 Liveable Cities	4		
RC4 module 3 (replaces GE)	4		
RC4 module 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4		
EG3301R DCP Project	6		
Sub-total	26	Sub-total	20

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
Group B module for Second Major	4	CN4101 Process Control and Safety	4
CN2106 Fluid Mechanics & Heat Transfer	4	CN4102 Chemical Engineering Lab	4
CN3103 Mass Transfer and Separation Processes	4	UE	2
CN3104 Computer-Aided Chemical Process Simulation	4	UE (or IE2141 Systems Thinking & Dynamics if not in RC4)	4
CDE2000 Creating Narratives	4		
Sub-total	26	Sub-total	20

Students must complete the following modules before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 MCs)
- MA1511 Engineering Calculus (2 MCs) – using MA1505 Mathematics I (remaining 2 MCs counted as UE)
- EG1311 Design & Make (4 MCs)

A one-semester NOC programme comprises the following modules:

- TR3202S Start-up Internship Programme (12 MCs) – replaces EG3611A (10 MCs) and EG2401A (2 MCs)
- TR3204 Entrepreneurship Practicum (4 MCs) – replaces Innovation & Enterprise Elective 1
- Entrepreneurship course (4 MCs) – replaces Innovation & Enterprise Elective 2

Students who are not going on NOC must read EG2101 Pathways to Engineering Leadership in lieu of EG2401A.

Recommended semester schedule – poly-intake students

(for students who are not required to take MA1301)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	MA1512 Differential Equations for Engineering	2
PF1101 Fundamentals of Project Management	4	EG3301R DCP Project	6
Group A module for Second Major	4	Group B module for Second Major	4
Sub-total	20	Sub-total	22

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
EG2501 Liveable Cities	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ES2631 Critique and Communication of Thinking and Design	4
GE	4	GE	4
EG3301R DCP Project	6	GE	4
Sub-total	26	Sub-total	24

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
CN3103 Mass Transfer and Separation Processes	4	Innovation & Enterprise Elective 1	4
CN3104 Computer-Aided Chemical Process Simulation	4	Innovation & Enterprise Elective 2	4
CN4101 Process Control and Safety	4	CN4102 Chemical Engineering Lab	4
CDE2000 Creating Narratives	4		
EG2401A Engineering Professionalism	2		
Sub-total	24	Sub-total	18

Poly-intake students with accredited diplomas will receive the following exemptions:

- EG1311 Design & Make (4 MCs)
- DTK1234 Design Thinking (4 MCs)
- EG3611A Industrial Attachment (10 MCs)
- Unrestricted elective modules (20 MCs)

Recommended semester schedule – poly-intake students

(for students who are required to take MA1301)

Semester 1	MCs	Semester 2	MCs
CN1101A Chemical Engineering Principles and Practice I	4	CN2102 Chemical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
PF1101 Fundamentals of Project Management	4	MA1511 Engineering Calculus	2
MA1301 Introductory Mathematics (UEM)	4	MA1512 Differential Equations for Engineering	2
Group A module for Second Major	4	EG3301R DCP Project	6
		Group B module for Second Major	4
Sub-total	20	Sub-total	22

Semester 3	MCs	Semester 4	MCs
CN2103 Mass & Energy Balance	4	CN2105 Reaction Engineering	4
CN2104 Chemical Engineering Thermodynamics	4	CN2106 Fluid Mechanics & Heat Transfer	4
MA1513 Linear Algebra with Differential Equations	2	IE2141 Systems Thinking & Dynamics	4
CE2407A Uncertainty Analysis for Engineers	2	ES2631 Critique and Communication of Thinking and Design	4
EE2211 Introduction to Machine Learning	4	GE	4
EG2501 Liveable Cities	4	GE	4
EG3301R DCP Project	6		
Sub-total	26	Sub-total	24

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation	6	EG4301 DCP Dissertation	6
CN3103 Mass Transfer and Separation Processes	4	Innovation & Enterprise Elective 1	4
CN3104 Computer-Aided Chemical Process Simulation	4	Innovation & Enterprise Elective 2	4
CN4101 Process Control and Safety	4	CN4102 Chemical Engineering Lab	4
CDE2000 Creating Narratives	4	GE	4
EG2401A Engineering Professionalism	2		
Sub-total	24	Sub-total	22

Poly-intake students with accredited diplomas will receive the following exemptions:

- EG1311 Design & Make (4 MCs)
- DTK1234 Design Thinking (4 MCs)
- EG3611A Industrial Attachment (10 MCs)
- Unrestricted elective modules (20 MCs)