

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

Cohort AY2025/2026

Course Requirements	Units
Common Curriculum	
CS1010E Programming Methodology (or other variants) ¹	4
CDE2501 Sustainable Systems for Liveable Cities ¹	4
ES2631 Critique and Communication of Thinking and Design ¹	4
GE: Cultures and Connections ¹	4
GE: Communities and Engagement ¹	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
EG1311 Design and Make or EG1311BE Design and Make	4
PF1101A Project Management and Finance	4
Sub-total for Common Curriculum	56
Engineering Core	
MA1511 Engineering Calculus	2
MA1512 Differential Equations for Engineering	2
MA1508E Linear Algebra for Engineering	4
EG2401A Engineering Professionalism	2
EG3611A Industrial Attachment or CFG2101 NUS Vacation Internship Programme ² and EG3612 Vacation Industrial Attachment	10
Sub-total for Engineering Core	20
Engineering Programme Requirements	
IE1111R Industrial & Systems Engrg Principles & Practice I ³	4
IE2111 Industrial & Systems Engrg Principles & Practice II	4
IE2100 Probability Models with Applications	4
IE2110 Operations Research I	4
IE2141 Systems Thinking and Dynamics	4
IE3101 Statistics for Engineering Applications	4
IE3110R Simulation	4
CS2040DE Data Structures and Algorithms	4
ST2334 Probability and Statistics	4
Technical electives	16
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up (over 2 consecutive semesters) ⁴	8
Sub-total for Engineering Programme Requirements	60
Unrestricted Electives	
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters)	12
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up (over 2 consecutive semesters) ⁴	4
Electives for Second Major ⁵	16
Other unrestricted electives	12
Sub-total for Unrestricted Electives	44
Total	160

NUS Innovation & Design Programme
College of Design and Engineering

Notes:

- ¹ Students may read equivalent courses in NUS College (NUSC), University Town College Programme (UTCP), and Ridge View Residential Programme (RVRC). CDE2501 fulfils GE: Singapore Studies while ES2631 fulfils GE: Critique and Expression.
- ² May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).
- ³ Students who complete IE1111R do not need to take other courses to fulfil GE: Data Literacy.
- ⁴ The 12 units for CDE4301/CDE4301A are counted towards 8 units for Integrated Project while 4 units are counted as unrestricted elective.
- ⁵ Students should clear at least one elective course from List I prior to CDE3301. Students in competition teams may enrol in CDE3301C Complex Systems Design: From Mission to Prototype in Semester 3 to Semester 4 (Year 2) or Semester 5 to Semester 6 (Year 3).

Sample study plan – JC-intake students or equivalent
(for students who opt for vacation internships)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

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

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

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

Semester 5	Units	Semester 6 – can be used for SEP	Units
CDE3301 Ideas to Proof-of-Concept	6	Elective 3 for Second Major	4
IE3101 Statistics for Engineering Applications	4	Technical Elective 2	4
IE3110R Simulation	4	Technical Elective 3	4
EG2401A Engineering Professionalism	2	UE	4
Technical Elective 1	4	UE	4
Sub-total	20	Sub-total	20

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Elective 4 for Second Major	4	UE	4
Technical Elective 4	4		
Sub-total	14	Sub-total	10

Sample study plan – JC-intake students or equivalent

(for students who opt for vacation internships **plus a specialisation**)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

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

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

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

Semester 5	Units	Semester 6 – can be used for SEP	Units
CDE3301 Ideas to Proof-of-Concept	6	Elective 3 for Second Major	4
IE3101 Statistics for Engineering Applications	4	Specialisation course 2	4
IE3110R Simulation	4	Specialisation course 3	4
EG2401A Engineering Professionalism	2	UE	4
Specialisation course 1	4	UE	4
Sub-total	20	Sub-total	20

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Elective 4 for Second Major	4	Specialisation course 5	4
Specialisation course 4	4		
Sub-total	14	Sub-total	10

Sample study plan – JC-intake students or equivalent
(for students who opt for industrial attachment)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE3301 Ideas to Proof-of-Concept	6	EG3611A Industrial Attachment	10
IE3101 Statistics for Engineering Applications	4		
IE3110R Simulation	4		
EG2401A Engineering Professionalism	2		
Technical Elective 1	4		
Sub-total	20	Sub-total	10

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Elective 3 for Second Major	4	Elective 4 for Second Major	4
Technical Elective 2	4	Technical Elective 4	4
Technical Elective 3	4	UE	4
UE	4	UE	4
Sub-total	22	Sub-total	22

Sample study plan – JC-intake students or equivalent

(for students who opt for industrial attachment **plus a specialisation**)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE3301 Ideas to Proof-of-Concept	6	EG3611A Industrial Attachment	10
IE3101 Statistics for Engineering Applications	4		
IE3110R Simulation	4		
EG2401A Engineering Professionalism	2		
Specialisation course 1	4		
Sub-total	20	Sub-total	10

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Elective 3 for Second Major	4	Elective 4 for Second Major	4
Specialisation course 2	4	Specialisation course 4	4
Specialisation course 3	4	Specialisation course 5	4
UE	4	UE	4
Sub-total	22	Sub-total	22

Sample study plan – JC-intake students or equivalent
(for students in year-long NOC programmes)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6 – NOC	Units
CDE3301 Ideas to Proof-of-Concept	6	NOC	
IE3101 Statistics for Engineering Applications	4		
IE3110R Simulation	4		
Technical Elective 1	4		
Sub-total	18	Sub-total	20

Semester 7 – NOC	Units	Semester 8	Units
NOC		Technical Elective 2	4
		Technical Elective 3	4
		Technical Elective 4	4
		UE	4
Sub-total	20	Sub-total	16

A year-long NOC programme comprises the following courses (up to 40 units):

- ETP3206L Innovation & Enterprise Internship (16 units) – replaces EG3611A (10 units), EG2401A (2 units), and UE (4 units)
- ETP3202L Innovation & Enterprise Case Study & Analysis (8 units) – replaces CDE4301A (8 units out of 12 units)
- ETP3203L Innovation & Enterprise Internship Practicum (8 units) – replaces CDE4301A (4 units out of 12 units) and UE (4 units)
- Entrepreneurship courses (up to 8 units) – replaces Electives 3 and 4 for Second Major (students will need to complete Electives 3 and/or 4 for Second Major in NUS if they are unable to complete 8 units of entrepreneurship courses during NOC)

Sample study plan – JC-intake students or equivalent
(for students in one-semester NOC programmes)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
DTK1234 Design Thinking	4	EG1311 Design and Make or EG1311BE Design and Make	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
GE	4	Elective 1 for Second Major (from List I)	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
CS2040DE Data Structures and Algorithms	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Second Major (from List I)	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6 – NOC	Units
CDE3301 Ideas to Proof-of-Concept	6	NOC	
IE3101 Statistics for Engineering Applications	4		
IE3110R Simulation	4		
Technical Elective 1	4		
Sub-total	18	Sub-total	20

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Technical Elective 2	4	Technical Elective 4	4
Technical Elective 3	4	UE	4
UE	4	UE	4
Sub-total	18	Sub-total	18

A one-semester NOC programme comprises the following courses (up to 20 units):

- ETP3201S Innovation & Enterprise Internship (12 units) – replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (Short) (4 units) – replaces Elective 3 for Second Major (4 units)
- Entrepreneurship course (4 units) – replaces Elective 4 for Second Major (4 units)

Sample study plan – JC-intake students or equivalent

(for students in Engineering Scholars Programme who plan to go for SEP)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
DTK1234 Design Thinking	4	IE2100 Probability Models with Applications	4
MA1512 Differential Equations for Engineering	2	ST2334 Probability and Statistics	4
RVRC/UTCP course 1 (replaces GE)	4	PF1101A Project Management and Finance	4
Elective 1 for Second Major (from List I)	4	RVRC/UTCP course 2 (replaces GE)	4
UE	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	22	Sub-total	26

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

Semester 3	Units	Semester 4 – can be used for SEP	Units
IE2110 Operations Research I	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
IE2141 Systems Thinking and Dynamics	4	RVRC/UTCP course 4 (replaces ES2631)	4
CS2040DE Data Structures and Algorithms	4	Elective 3 for Second Major	4
RVRC/UTCP course 3 (replaces CDE2501)	4	Elective 4 for Second Major	4
Elective 2 for Second Major (from List I)	4	UE	4
CDE3301 Ideas to Proof-of-Concept	6		
Sub-total	26	Sub-total	20

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

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
IE3101 Statistics for Engineering Applications	4	Technical Elective 2	4
IE3110R Simulation	4	Technical Elective 3	4
Technical Elective 1	4	Technical Elective 4	4
EG2401A Engineering Professionalism	2	UE	2
Sub-total	20	Sub-total	20

Students are highly encouraged to complete the following courses before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 units)
- EG1311 Design and Make (4 units)
- MA1505 Mathematics I (4 units) – replaces MA1511 Engineering Calculus (2 units) and counted as UE (2 units)
- MA2001 Linear Algebra (4 units) – replaces MA1508E Linear Algebra for Engineering (4 units)

Sample study plan – JC-intake students or equivalent

(for students in Engineering Scholars Programme who plan to go for one-semester NOC programmes)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
DTK1234 Design Thinking	4	IE2100 Probability Models with Applications	4
MA1512 Differential Equations for Engineering	2	ST2334 Probability and Statistics	4
RVRC/UTCP course 1 (replaces GE)	4	PF1101A Project Management and Finance	4
Elective 1 for Second Major (from List I)	4	RVRC/UTCP course 2 (replaces GE)	4
UE	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	22	Sub-total	26

Semester 3	Units	Semester 4 – NOC	Units
IE2110 Operations Research I	4	NOC	
IE2141 Systems Thinking and Dynamics	4		
CS2040DE Data Structures and Algorithms	4		
RVRC/UTCP course 3 (replaces CDE2501)	4		
Elective 2 for Second Major (from List I)	4		
CDE3301 Ideas to Proof-of-Concept	6		
Sub-total	26	Sub-total	20

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
IE3101 Statistics for Engineering Applications	4	Technical Elective 2	4
IE3110R Simulation	4	Technical Elective 3	4
Technical Elective 1	4	Technical Elective 4	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	UE	4
RVRC/UTCP course 4 (replaces ES2631)	4	UE	2
Sub-total	26	Sub-total	24

Students are highly encouraged to complete the following courses before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 units)
- EG1311 Design and Make (4 units)
- MA1505 Mathematics I (4 units) – replaces MA1511 Engineering Calculus (2 units) and counted as UE (2 units)
- MA2001 Linear Algebra (4 units) – replaces MA1508E Linear Algebra for Engineering (4 units)

A one-semester NOC programme comprises the following courses (up to 20 units):

- ETP3201S Innovation & Enterprise Internship (12 units) – replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (Short) (4 units) – replaces Elective 3 for Second Major (4 units)
- Entrepreneurship course (4 units) – replaces Elective 4 for Second Major (4 units)

Sample study plan – poly-intake students

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engrg Principles & Practice I	4	IE2111 Industrial & Systems Engrg Principles & Practice II	4
CS1010E Programming Methodology	4	MA1511 Engineering Calculus *	2
MA1301 Introductory Mathematics * (UE)	4	MA1508E Linear Algebra for Engineering	4
PC1201 Fundamentals of Physics ^ (UE) – if required	4	PF1101A Project Management and Finance	4
Elective 1 for Second Major (from List I)	4	Elective 2 for Second Major (from List I)	4
		CDE3301 Ideas to Proof-of-Concept	6
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
IE2141 Systems Thinking and Dynamics	4	CDE2501 Sustainable Systems for Liveable Cities	4
MA1512 Differential Equations for Engineering *	2	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
ST2334 Probability and Statistics	4	CS2040DE Data Structures and Algorithms	4
GE	4	ES2631 Critique and Communication of Thinking and Design	4
CDE3301 Ideas to Proof-of-Concept	6	GE ^	4
Sub-total	24	Sub-total	24

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6	CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	6
Elective 3 for Second Major	4	Elective 4 for Second Major	4
IE3101 Statistics for Engineering Applications	4	Technical Elective 2	4
IE3110R Simulation	4	Technical Elective 3	4
EG2401A Engineering Professionalism	2	Technical Elective 4	4
Technical Elective 1	4		
Sub-total	24	Sub-total	22

* Students who are exempted from MA1301 can take MA1511 and MA1512 in Semester 1.

^ Students who are exempted from PC1201 can take a GE in Semester 1.

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

- DTK1234 Design Thinking (4 units)
- EG1311 Design and Make (4 units)
- EG3611P Industrial Attachment (10 units)
- Unrestricted electives (20 units)