

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

**Cohort AY2024/2025**

Course Requirements	Units
<b>Common Curriculum</b>	
CS1010E Programming Methodology	4
ES2631 Critique and Communication of Thinking and Design <sup>1</sup>	4
GEC: Cultures and Connections <sup>1</sup>	4
GEN: Communities and Engagement <sup>1</sup>	4
CDE2501 Liveable Cities <sup>1, 2</sup>	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
EG1311 Design and Make	4
IE2141 Systems Thinking and Dynamics <sup>3</sup>	4
PF1101 Fundamentals of Project Management or PF1101A Project Management and Finance	4
Additional technical courses for Engineering major <sup>3</sup>	8
IE3100R Systems Design Project (over 2 consecutive semesters) <sup>4</sup>	8
<b>Sub-total for Common Curriculum</b>	<b>56</b>
<b>Engineering Core</b>	
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 <sup>5</sup> and EG3612 Vacation Industrial Attachment	10
<b>Sub-total for Engineering Core</b>	<b>20</b>
<b>Engineering Programme Requirements</b>	
IE1111R Industrial & Systems Engineering Principles & Practice I <sup>6</sup>	4
IE2111 Industrial & Systems Engineering Principles & Practice II	4
IE2100 Probability Models with Applications	4
IE2110 Operations Research I	4
IE3101 Statistics for Engineering Applications	4
IE3110R Simulation	4
CS2040 Data Structures and Algorithms	4
ST2334 Probability and Statistics	4
Technical electives	8
<b>Sub-total for Engineering Programme Requirements</b>	<b>40</b>
<b>Unrestricted Electives</b>	
Group A course for Minor	4
Group B course for Minor	4
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters)	12
Other unrestricted electives <sup>4</sup>	24
<b>Sub-total for Unrestricted Electives</b>	<b>44</b>
<b>Total</b>	<b>160</b>

**NUS Innovation & Design Programme**  
**College of Design and Engineering**

Notes:

- <sup>1</sup> Students may read equivalent courses in NUS College (NUSC), University Town College Programme (UTCP), and Ridge View Residential Programme (RVRC).
- <sup>2</sup> Students who are not in NUSC, UTCP or RVRC but have read another GESS Singapore Studies course prior to CDE2501 must still complete CDE2501.

- <sup>3</sup> Students who have already read CDE2000 Creating Narratives must still complete the 8 units of additional technical courses from their Engineering major.

The latest list of additional technical course may be found on this website:  
<https://cde.nus.edu.sg/undergraduate/curriculum-structure/>

Poly-intake students and those in the Engineering Scholars Programme only need to complete 4 units of additional technical course (excluding IE2141). The remaining 4 units may be fulfilled by CDE2501 (if not in NUSC/UTCP/RVRC and using another course to fulfil Singapore Studies), CDE2000, or a second additional technical course.

- <sup>4</sup> Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of EE4002D/EE4002R and 4 units of unrestricted electives.
- <sup>5</sup> May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).
- <sup>6</sup> Students who complete IE1111R do not need to take GEA1000 Quantitative Reasoning with Data in the Common Curriculum.

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

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
EG1311 Design and Make	4	DTK1234 Design Thinking	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101 Fundamentals of Project Management	4
GEC/GEN	4	Group A/B course for Minor	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

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

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
CS2040 Data Structures and Algorithms	4	CDE2501 Liveable Cities	4
ES2631 Critique and Communication of Thinking and Design	4	EE2211 Introduction to Machine Learning	4
IE2141 Systems Thinking and Dynamics	4	Additional technical course 1	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept	6
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

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

Semester 5	Units	Semester 6 – can be used for SEP	Units
CDE3301 Ideas to Proof-of-Concept	6	Technical Elective 1	4
IE3101 Statistics for Engineering Applications	4	Additional technical course 2	4
IE3110R Simulation	4	UE	4
EG2401A Engineering Professionalism	2	UE	4
GEC/GEN	4	UE	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 7	Units	Semester 8	Units
IE3100R Systems Design Project	4	IE3100R Systems Design Project	4
Technical Elective 2	4	UE	4
UE	4	UE	4
<b>Sub-total</b>	<b>12</b>	<b>Sub-total</b>	<b>12</b>

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

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice II	4
CS1010E Programming Methodology	4	ST2334 Probability and Statistics	4
EG1311 Design and Make	4	DTK1234 Design Thinking	4
MA1511 Engineering Calculus	2	MA1508E Linear Algebra for Engineering	4
MA1512 Differential Equations for Engineering	2	PF1101 Fundamentals of Project Management	4
GEC/GEN	4	Group A/B course for Minor	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
CS2040 Data Structures and Algorithms	4	CDE2501 Liveable Cities	4
ES2631 Critique and Communication of Thinking and Design	4	EE2211 Introduction to Machine Learning	4
IE2141 Systems Thinking and Dynamics	4	Additional technical course 1	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept	6
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

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		
Additional technical course 2	4		
GEC/GEN	4		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	Units	Semester 8	Units
IE3100R Systems Design Project	4	IE3100R Systems Design Project	4
Technical Elective 1	4	Technical Elective 2	4
UE	4	UE	4
UE	4	UE	4
UE	4	UE	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

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

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering Principles & Practice II	4
MA1512 Differential Equations for Engineering	2	IE2100 Probability Models with Applications	4
UTCP course 1 (replaces GE)	4	ST2334 Probability and Statistics	4
Group B course for Minor	4	DTK1234 Design Thinking	4
UE	4	UTCP course 2 (replaces GE)	4
UE (or IE2141 Systems Thinking and Dynamics if not in RC4)	4	CDE3301 Ideas to Proof-of-Concept	6
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>26</b>

Semester 3	Units	Semester 4 – NOC	Units
IE2110 Operations Research I	4	NOC	
IE3101 Statistics for Engineering Applications	4		
IE3110R Simulation	4		
CS2040 Data Structures and Algorithms	4		
UTCP course 3 (replaces CDE2501)	4		
CDE3301 Ideas to Proof-of-Concept	6		
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>20</b>

Semester 5	Units	Semester 6	Units
IE3100R Systems Design Project	4	IE3100R Systems Design Project	4
UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4	Additional technical course 1	4
Technical Elective 1	4	Additional technical course 2	4
Technical Elective 2	4	EE2211 Introduction to Machine Learning	4
UE	4	PF1101A Project Management and Finance	4
UE	2	UE	4
Group A course for Minor	4		
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>24</b>

Students must 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 (4 units) – counted as UE (4 units)
- Entrepreneurship course (4 units) – counted as UE (4 units)

**Recommended semester schedule – poly-intake students**

(for students who may want to upgrade to a Second Major)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering 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)	4	PF1101 Fundamentals of Project Management	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept	6
		Group A/B course for Minor	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
MA1512 Differential Equations for Engineering *	2	CS2040 Data Structures and Algorithms	4
ST2334 Probability and Statistics	4	CDE2501 Liveable Cities	4
ES2631 Critique and Communication of Thinking and Design	4	EE2211 Introduction to Machine Learning	4
IE2141 Systems Thinking and Dynamics	4	Additional technical course 1	4
CDE3301 Ideas to Proof-of-Concept	6	GEC/GEN	4
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>24</b>

Semester 5	Units	Semester 6	Units
IE3100R Systems Design Project	4	IE3100R Systems Design Project	4
IE3101 Statistics for Engineering Applications	4	Technical Elective 1	4
IE3110R Simulation	4	Technical Elective 2	4
EG2401A Engineering Professionalism	2	Additional technical course 2	4
GEC/GEN	4		
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>16</b>

\* Students who are exempted from MA1301 can take MA1511 and MA1512 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)

**Recommended semester schedule – poly-intake students**

(for students who are not planning to upgrade to a Second Major)

Semester 1	Units	Semester 2	Units
IE1111R Industrial & Systems Engineering Principles & Practice I	4	IE2111 Industrial & Systems Engineering 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)	4	PF1101 Fundamentals of Project Management	4
GEC/GEN	4	GEC/GEN	4
		Group A/B course for Minor	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

Semester 3	Units	Semester 4	Units
IE2110 Operations Research I	4	IE2100 Probability Models with Applications	4
MA1512 Differential Equations for Engineering *	2	CS2040 Data Structures and Algorithms	4
ST2334 Probability and Statistics	4	CDE2501 Liveable Cities	4
ES2631 Critique and Communication of Thinking and Design	4	EE2211 Introduction to Machine Learning	4
IE2141 Systems Thinking and Dynamics	4	Additional technical course 1	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept	6
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>26</b>

Semester 5	Units	Semester 6	Units
IE3100R Systems Design Project	4	IE3100R Systems Design Project	4
IE3101 Statistics for Engineering Applications	4	Technical Elective 1	4
IE3110R Simulation	4	Technical Elective 2	4
EG2401A Engineering Professionalism	2	Additional technical course 2	4
CDE3301 Ideas to Proof-of-Concept	6		
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>16</b>

\* Students who are exempted from MA1301 can take MA1511 and MA1512 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)