NUS Innovation & Design Programme
College of Design and Engineering

Bachelor of Engineering (Engineering Science) with Minor in Innovation & Design

Cohort AY2024/2025

Course Requirements	Units
Common Curriculum	
GEA1000 Quantitative Reasoning with Data	4
CS1010E Programming Methodology	4
ES2631 Critique and Communication of Thinking and Design [1]	4
GEC: Cultures and Connections [1]	4
GEN: Communities and Engagement [1]	4
CDE2501 Liveable Cities [1, 2]	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
EG1311 Design and Make	4
PF1101 Fundamentals of Project Management or PF1101A Project Management and Finance	4
Additional technical courses for Engineering major [3]	12
ESP4901 Research Project (over 2 consecutive semesters) [4]	8
Sub-total for Common Curriculum	**60**
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 [5] and EG3612 Vacation Industrial Attachment	10
Sub-total for Engineering Core	**20**
Engineering Programme Requirements	
ESP1111 Engineering Principles in Action	4
ESP2111 Sensor System Electronics	4
ESP2106 Principles of Continua	4
ESP2107 Numerical Methods and Statistics	4
ESP2110 Design Project	4
ME2121 Engineering Thermodynamics and Heat Transfer	4
PC2130B Applied Quantum Physics	4
PC3235B Applied Solid State Physics	4
PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) [6]	4
Sub-total for Engineering Programme Requirements	**40**
Unrestricted Electives	
Group A course for Minor	4
Group B course for Minor	4
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) [6]	8
Other unrestricted electives [4]	24
Sub-total for Unrestricted Electives	**40**
Total	**160**

(updated 16 July 2025)

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Notes:

[1] Students may read equivalent courses in NUS College (NUSC), University Town College Programme (UTCP), and Ridge View Residential Programme (RVRC).

[2] Students who are not in NUSC, UTCP or RVRC but have read another GESS Singapore Studies course prior to CDE2501 must still complete CDE2501.

[3] Students who have already read CDE2000 Creating Narratives and/or IE2141 Systems Thinking and Dynamics must still complete the 12 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 8 units of additional technical course. The remaining 4 units may be fulfilled by CDE2501 (if not in NUSC/UTCP/RVRC and using another course to fulfil Singapore Studies), CDE2000, IE2141, or a third additional technical course.

[4] Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of ESP4901 and 4 units of unrestricted electives.

[5] May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).

[6] The 12 units for CDE3301 are counted towards 4 units for ESP3903 Major Design Project II while 8 units are counted as unrestricted elective.

(updated 16 July 2025)

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Recommended semester schedule – JC-intake students or equivalent

(for students who opt for vacation internships)

Semester 1	Units	Semester 2	Units
ESP1111 Engineering Principles in Action	4	ESP2111 Sensor System Electronics	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	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 Minor	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
ESP2107 Numerical Methods and Statistics	4	CDE2501 Liveable Cities	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ESP2110 Design Project	4
Additional technical course 1	4	PC3235B Applied Solid State Physics	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	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 (replaces ESP3903)	6	Additional technical course 3	4
ESP2106 Principles of Continua	4	EG2401A Engineering Professionalism	2
Additional technical course 2	4	PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4
GEC/GEN	4	PC2130B Applied Quantum Physics	4
		UE	4
Sub-total	**18**	**Sub-total**	**18**

Semester 7	Units	Semester 8	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
UE	4	UE	4
UE	4	UE	4
UE	4		
Sub-total	**16**	**Sub-total**	**12**

(updated 16 July 2025)

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Recommended semester schedule – JC-intake students or equivalent

(for students who opt for industrial attachment)

Semester 1	Units	Semester 2	Units
ESP1111 Engineering Principles in Action	4	ESP2111 Sensor System Electronics	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	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
Sub-total	**20**	**Sub-total**	**24**

Semester 3	Units	Semester 4	Units
ESP2107 Numerical Methods and Statistics	4	CDE2501 Liveable Cities	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ESP2110 Design Project	4
Additional technical course 1	4	PC3235B Applied Solid State Physics	4
Group A/B course for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6
Sub-total	**20**	**Sub-total**	**22**

Semester 5	Units	Semester 6	Units
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6	EG3611A Industrial Attachment	10
ESP2106 Principles of Continua	4		
EG2401A Engineering Professionalism	2		
PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4		
GEC/GEN	4		
Sub-total	**20**	**Sub-total**	**10**

Semester 7	Units	Semester 8	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
Additional technical course 2	4	Additional technical course 3	4
UE	4	PC2130B Applied Quantum Physics	4
UE	4	UE	4
UE	4	UE	4
UE	4		
Sub-total	**24**	**Sub-total**	**20**

(updated 16 July 2025)

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Recommended semester schedule – JC-intake students or equivalent

(for students in Engineering Scholars Programme)

Semester 1	Units	Semester 2	Units
ESP1111 Engineering Principles in Action	4	ESP2111 Sensor System Electronics	4
ESP2107 Numerical Methods and Statistics	4	GEA1000 Quantitative Reasoning with Data	4
MA1512 Differential Equations for Engineering	2	DTK1234 Design Thinking	4
UTCP course 1 (replaces GE)	4	ESP2110 Design Project	4
Group B course for Minor	4	UTCP course 2 (replaces GE)	4
UE (or IE2141 Systems Thinking & Dynamics if not in RC4)	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6
Sub-total	**22**	**Sub-total**	**26**

Semester 3	Units	Semester 4 – NOC	Units
ESP2106 Principles of Continua	4	NOC	
ME2121 Engineering Thermodynamics and Heat Transfer	4		
PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4		
Additional technical course 1	4		
UTCP course 3 (replaces CDE2501)	4		
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6		
Sub-total	**26**	**Sub-total**	**20**

Semester 5	Units	Semester 6	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4	Additional technical course 2	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	PF1101 Fundamentals of Project Management	4
UE	4	PC2130B Applied Quantum Physics	4
UE	4	PC3235B Applied Solid State Physics	4
UE	2	UE	4
Group A course for Minor	4		
Sub-total	**26**	**Sub-total**	**24**

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)

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Recommended semester schedule – poly-intake students

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

Semester 1	Units	Semester 2	Units
ESP1111 Engineering Principles in Action	4	ESP2111 Sensor System Electronics	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
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 (replaces ESP3903)	6
		Group A/B course for Minor	4
Sub-total	**20**	**Sub-total**	**26**

Semester 3	Units	Semester 4	Units
MA1511 Engineering Calculus *	2	CDE2501 Liveable Cities	4
MA1512 Differential Equations for Engineering *	2	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ESP2110 Design Project	4
ESP2107 Numerical Methods and Statistics	4	PC2130B Applied Quantum Physics	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4
Additional technical course 1	4	PC3235B Applied Solid State Physics	4
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6		
Sub-total	**26**	**Sub-total**	**24**

Semester 5	Units	Semester 6	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP2106 Principles of Continua	4	EG2401A Engineering Professionalism	2
GEC/GEN	4	Additional technical course 2	4
GEC/GEN	4	Additional technical course 3	4
Sub-total	**16**	**Sub-total**	**14**

* 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)

(updated 16 July 2025)

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Recommended semester schedule – poly-intake students

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

Semester 1	Units	Semester 2	Units
ESP1111 Engineering Principles in Action	4	ESP2111 Sensor System Electronics	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
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
Sub-total	**20**	**Sub-total**	**24**

Semester 3	Units	Semester 4	Units
MA1511 Engineering Calculus *	2	CDE2501 Liveable Cities	4
MA1512 Differential Equations for Engineering *	2	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ESP2110 Design Project	4
ESP2107 Numerical Methods and Statistics	4	PC2130B Applied Quantum Physics	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	PC2020 Electromagnetics for Electrical Engineers or EE2023 Signals and Systems	4
Additional technical course 1	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6
Group A/B course for Minor	4		
Sub-total	**24**	**Sub-total**	**26**

Semester 5	Units	Semester 6	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP2106 Principles of Continua	4	PC3235B Applied Solid State Physics	4
Additional technical course 2	4	EG2401A Engineering Professionalism	2
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903)	6	Additional technical course 3	4
Sub-total	**18**	**Sub-total**	**14**

* 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)

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