

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

Cohort AY2025/2026

Course Requirements	Units
Common Curriculum	
GEA1000 Quantitative Reasoning with Data ¹	4
CS1010E Programming Methodology (or other variants) ²	4
CDE2501 Liveable Cities ²	4
ES2631 Critique and Communication of Thinking and Design ²	4
GE: Cultures and Connections ²	4
GE: Communities and Engagement ²	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	40
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 ³ 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/ESP3106 Principles of Continua	4
ESP2107 Numerical Methods and Statistics	4
ESP2110 Design Project	4
ESP3201A Machine Learning in Engineering Science	4
EE2023 Signals and Systems	4
ME2121 Engineering Thermodynamics and Heat Transfer	4
PC2020 Electromagnetics for Electrical Engineers	4
PC2130B Applied Quantum Physics	4
PC3235B Applied Solid State Physics	4
EE3331C Feedback Control Systems or ME3142 Feedback Control Systems	4
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) ^{4, 5}	4
ESP4901 Research Project (over 2 consecutive semesters) ⁶	8
Sub-total for Engineering Programme Requirements	60
Unrestricted Electives	
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) ^{4, 5}	8
Electives for Minor ⁵	8
Other unrestricted electives ⁶	24
Sub-total for Unrestricted Electives	40
Total	160

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Notes:

- ¹ Students may read other approved courses for Data Literacy in lieu of GEA1000.
- ² 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.
- ³ May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).
- ⁴ The 12 units for CDE3301 are counted towards 4 units for ESP3903 Major Design Project 2 / ESP4902 Major Design Project while 8 units are counted as unrestricted elective. 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).
- ⁵ Students should clear at least one elective course prior to CDE3301.
- ⁶ Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of ESP4901 and 4 units of unrestricted electives.

Sample study plan – 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
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 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
CDE2501 Sustainable Systems for Liveable Cities	4	EE2023 Signals and Systems	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	ESP2107 Numerical Methods and Statistics	4
GE	4	ESP2110 Design Project	4
UE	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
Elective 2 for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	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/ESP4902)	6	ES2631 Critique and Communication of Thinking and Design	4
ESP2106/ESP3106 Principles of Continua	4	EE3331C Feedback Control Systems or ME3142 Feedback Control Systems	4
UE	4	PC2020 Electromagnetics for Electrical Engineers	4
UE	4	PC3235B Applied Solid State Physics	4
UE	4	EG2401A Engineering Professionalism	2
Sub-total	22	Sub-total	18

Semester 7	Units	Semester 8	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP3201A Machine Learning in Engineering Science	4	PC2130B Applied Quantum Physics	4
UE	4	UE	4
Sub-total	12	Sub-total	12

Sample study plan – 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
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 Minor	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
CDE2501 Sustainable Systems for Liveable Cities	4	EE2023 Signals and Systems	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	ESP2107 Numerical Methods and Statistics	4
GE	4	ESP2110 Design Project	4
UE	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
Elective 2 for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6	EG3611A Industrial Attachment	10
ESP2106/ESP3106 Principles of Continua	4		
ES2631 Critique and Communication of Thinking and Design	4		
EE3331C Feedback Control Systems <u>or</u> ME3142 Feedback Control Systems	4		
PC2020 Electromagnetics for Electrical Engineers	4		
EG2401A Engineering Professionalism	2		
Sub-total	24	Sub-total	10

Semester 7	Units	Semester 8	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP3201A Machine Learning in Engineering Science	4	PC2130B Applied Quantum Physics	4
UE	4	PC3235B Applied Solid State Physics	4
UE	4	UE	4
UE	4	UE	4
Sub-total	20	Sub-total	20

Sample study plan – 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
ESP2106/ESP3106 Principles of Continua	4	ESP2110 Design Project	4
DTK1234 Design Thinking	4	GEA1000 Quantitative Reasoning with Data	4
MA1512 Differential Equations for Engineering	2	PF1101A Project Management and Finance	4
RVRC/UTCP course 1 (replaces GE)	4	RVRC/UTCP course 2 (replaces GE)	4
Elective 1 for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	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/NOC	Units
EE2023 Signals and Systems	4	ESP2107 Numerical Methods and Statistics	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	PC2020 Electromagnetics for Electrical Engineers	4
UE	4	EE2211 Introduction to Machine Learning <u>or</u> EE2213 Introduction to Artificial Intelligence	4
RVRC/UTCP course 3 (replaces CDE2501)	4	UE	4
Elective 2 for Minor	4	RVRC/UTCP course 4 (replaces ES2631)	4
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	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
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP3201A Machine Learning in Engineering Science	4	PC2130B Applied Quantum Physics	4
EE3331C Feedback Control Systems <u>or</u> ME3142 Feedback Control Systems	4	PC3235B Applied Solid State Physics	4
UE	4	EG2401A Engineering Professionalism	2
UE	4	UE	4
		UE	2
Sub-total	20	Sub-total	20

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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)

CFG2101 may be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).

Sample study plan – 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	ESP2110 Design Project	4
MA1301 Introductory Mathematics * (UE)	4	GEA1000 Quantitative Reasoning with Data	4
PC1201 Fundamentals of Physics ^ (UE)	4	MA1508E Linear Algebra for Engineering	4
Elective 1 for Minor	4	PF1101A Project Management and Finance	4
		CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6
Sub-total	20	Sub-total	26

Semester 3	Units	Semester 4	Units
CDE2501 Sustainable Systems for Liveable Cities	4	ESP2107 Numerical Methods and Statistics	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	EE2023 Signals and Systems	4
MA1511 Engineering Calculus *	2	PC2020 Electromagnetics for Electrical Engineers	4
MA1512 Differential Equations for Engineering *	2	PC3235B Applied Solid State Physics	4
Elective 2 for Minor	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6	EG2401A Engineering Professionalism	2
Sub-total	22	Sub-total	22

Semester 5	Units	Semester 6	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP2106/ESP3106 Principles of Continua	4	ES2631 Critique and Communication of Thinking and Design	4
ESP3201A Machine Learning in Engineering Science	4	EE3331C Feedback Control Systems or ME3142 Feedback Control Systems	4
GE *	4	PC2130B Applied Quantum Physics	4
GE ^	4		
Sub-total	20	Sub-total	16

* Students who are exempted from MA1301 can take MA1511 and MA1512 in Semester 1 and a GE in Semester 3.

^ 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)

Sample study plan – 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	ESP2110 Design Project	4
MA1301 Introductory Mathematics * (UE)	4	GEA1000 Quantitative Reasoning with Data	4
PC1201 Fundamentals of Physics ^ (UE)	4	MA1508E Linear Algebra for Engineering	4
GE	4	PF1101A Project Management and Finance	4
		Elective 1 for Minor ^	4
Sub-total	20	Sub-total	24

Semester 3	Units	Semester 4	Units
CDE2501 Sustainable Systems for Liveable Cities	4	ESP2107 Numerical Methods and Statistics	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	EE2023 Signals and Systems	4
MA1511 Engineering Calculus *	2	PC2020 Electromagnetics for Electrical Engineers	4
MA1512 Differential Equations for Engineering *	2	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
GE	4	EG2401A Engineering Professionalism	2
Elective 2 for Minor	4	CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6
Sub-total	20	Sub-total	24

Semester 5	Units	Semester 6	Units
ESP4901 Research Project	4	ESP4901 Research Project	4
ESP2106/ESP3106 Principles of Continua	4	ES2631 Critique and Communication of Thinking and Design	4
ESP3201A Machine Learning in Engineering Science	4	EE3331C Feedback Control Systems or ME3142 Feedback Control Systems	4
CDE3301 Ideas to Proof-of-Concept (replaces ESP3903/ESP4902)	6	PC2130B Applied Quantum Physics	4
		PC3235B Applied Solid State Physics	4
Sub-total	18	Sub-total	20

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

^ Students who are exempted from PC1201 can take an Elective for the Minor 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)