NUS Innovation & Design Programme
College of Design and Engineering

Bachelor of Engineering (Robotics & Machine Intelligence) 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)	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
MA1513 Linear Algebra with Differential Equations	2
CE2407A Uncertainty Analysis of 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	
RB1101 Fundamentals of Robotics I	4
RB2101 Fundamentals of Robotics II	4
RB2202 Kinematics and Dynamics for Robots	4
RB2203 Robot Control	4
RB2301 Robot Programming	4
RB2302 Fundamentals of Artificial Neural Networks	4
RB3301 Introduction to Machine Intelligence	4
RB3302 Planning and Navigation	4
RB3303 Robotic System Design and Application	4
Technical electives	16
RB4101A B.Eng. Dissertation (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) [5]	12
Electives for Minor [5]	8
Other unrestricted electives [4]	20
Sub-total for Unrestricted Electives	**40**
Total	**160**

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

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] Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of RB4101A and 4 units of unrestricted electives.

[5] Students should clear at least one elective course from List I prior to CDE3301.

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

Recommended semester schedule – JC-intake students or equivalent

(for students who opt for vacation internships)

Semester 1	Units	Semester 2	Units
RB1101 Fundamentals of Robotics I	4	RB2101 Fundamentals of Robotics II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design and Make or EG1311BE Design and Make	4	DTK1234 Design Thinking	4
CE2407A Uncertainty Analysis of Engineers	2	MA1512 Differential Equations for Engineering	2
MA1511 Engineering Calculus	2	MA1513 Linear Algebra with Differential Equations	2
GE	4	PF1101A Project Management and Finance	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
RB2202 Kinematics and Dynamics for Robots	4	RB2203 Robot Control	4
RB2301 Robot Programming	4	RB2302 Fundamentals of Artificial Neural Networks	4
RB3302 Planning and Navigation	4	CDE2501 Liveable Cities	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Minor	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	RB3301 Introduction to Machine Intelligence	4
Technical Elective 1	4	RB3303 Robotic System Design and Application	4
EG2401A Engineering Professionalism	2	Technical Elective 2	4
GE	4	UE	4
UE	4	UE	4
Sub-total	**20**	**Sub-total**	**20**

Semester 7	Units	Semester 8	Units
RB4101A B.Eng. Dissertation	4	RB4101A B.Eng. Dissertation	4
Technical Elective 3	4	Technical Elective 4	4
UE	4	UE	4
Sub-total	**12**	**Sub-total**	**12**

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

Recommended semester schedule – JC-intake students or equivalent

(for students who opt for industrial attachment)

Semester 1	Units	Semester 2	Units
RB1101 Fundamentals of Robotics I	4	RB2101 Fundamentals of Robotics II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design and Make or EG1311BE Design and Make	4	DTK1234 Design Thinking	4
CE2407A Uncertainty Analysis of Engineers	2	MA1512 Differential Equations for Engineering	2
MA1511 Engineering Calculus	2	MA1513 Linear Algebra with Differential Equations	2
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
RB2202 Kinematics and Dynamics for Robots	4	RB2203 Robot Control	4
RB2301 Robot Programming	4	RB2302 Fundamentals of Artificial Neural Networks	4
RB3302 Planning and Navigation	4	CDE2501 Liveable Cities	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	ES2631 Critique and Communication of Thinking and Design	4
Elective 2 for Minor	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
RB3301 Introduction to Machine Intelligence	4		
RB3303 Robotic System Design and Application	4		
EG2401A Engineering Professionalism	2		
GE	4		
Sub-total	**20**	**Sub-total**	**10**

Semester 7	Units	Semester 8	Units
RB4101A B.Eng. Dissertation	4	RB4101A B.Eng. Dissertation	4
Technical Elective 1	4	Technical Elective 3	4
Technical Elective 2	4	Technical Elective 4	4
UE	4	UE	4
UE	4	UE	4
UE	4		
Sub-total	**24**	**Sub-total**	**20**

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

Recommended semester schedule – JC-intake students or equivalent

(for students in Engineering Scholars Programme)

Semester 1	Units	Semester 2	Units
RB1101 Fundamentals of Robotics I	4	RB2101 Fundamentals of Robotics II	4
CE2407A Uncertainty Analysis of Engineers	2	GEA1000 Quantitative Reasoning with Data	4
RVRC/UTCP course 1 (replaces GE)	4	DTK1234 Design Thinking	4
Elective 1 for Minor	4	MA1512 Differential Equations for Engineering	2
UE	4	MA1513 Linear Algebra with Differential Equations	2
UE	2	RVRC/UTCP course 2 (replaces GE)	4
PF1101A Project Management and Finance	4	CDE3301 Ideas to Proof-of-Concept	6
Sub-total	**24**	**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
RB2202 Kinematics and Dynamics for Robots	4	RB2203 Robot Control	4
RB2301 Robot Programming	4	RB2302 Fundamentals of Artificial Neural Networks	4
RB3302 Planning and Navigation	4	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
RVRC/UTCP course 3 (replaces CDE2501)	4	RVRC/UTCP course 4 (replaces ES2631)	4
Elective 2 for Minor	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
RB4101A B.Eng. Dissertation	4	RB4101A B.Eng. Dissertation	4
Technical Elective 1	4	RB3301 Introduction to Machine Intelligence	4
Technical Elective 2	4	RB3303 Robotic System Design and Application	4
EG2401A Engineering Professionalism	2	Technical Elective 3	4
UE	4	Technical Elective 4	4
UE	4		
Sub-total	**22**	**Sub-total**	**20**

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

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)

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

(updated 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

Recommended semester schedule – poly-intake students

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

Semester 1	Units	Semester 2	Units
RB1101 Fundamentals of Robotics I	4	RB2101 Fundamentals of Robotics II	4
CS1010E Programming Methodology	4	RB2302 Fundamentals of Artificial Neural Networks	4
MA1301 Introductory Mathematics * (UE)	4	GEA1000 Quantitative Reasoning with Data	4
ES2631 Critique and Communication of Thinking and Design	4	MA1512 Differential Equations for Engineering	2
Elective 1 for Minor	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101A Project Management and Finance	4
		CDE3301 Ideas to Proof-of-Concept	6
Sub-total	**20**	**Sub-total**	**26**

Semester 3	Units	Semester 4	Units
RB2202 Kinematics and Dynamics for Robots	4	RB2203 Robot Control	4
RB2301 Robot Programming	4	RB3301 Introduction to Machine Intelligence	4
RB3302 Planning and Navigation	4	CDE2501 Liveable Cities	4
CE2407A Uncertainty Analysis of Engineers *	2	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
MA1511 Engineering Calculus *	2	EG2401A Engineering Professionalism	2
Elective 2 for Minor	4	GE	4
CDE3301 Ideas to Proof-of-Concept	6		
Sub-total	**26**	**Sub-total**	**22**

Semester 5	Units	Semester 6	Units
RB4101A B.Eng. Dissertation	4	RB4101A B.Eng. Dissertation	4
Technical Elective 1	4	RB3303 Robotic System Design and Application	4
Technical Elective 2	4	Technical Elective 3	4
GE	4	Technical Elective 4	4
Sub-total	**16**	**Sub-total**	**16**

* Students who are exempted from MA1301 can take CE2407A and MA1511 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 4 July 2025)

NUS Innovation & Design Programme
College of Design and Engineering

Recommended semester schedule – poly-intake students

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

Semester 1	Units	Semester 2	Units
RB1101 Fundamentals of Robotics I	4	RB2101 Fundamentals of Robotics II	4
CS1010E Programming Methodology	4	RB2302 Fundamentals of Artificial Neural Networks	4
MA1301 Introductory Mathematics * (UE)	4	GEA1000 Quantitative Reasoning with Data	4
ES2631 Critique and Communication of Thinking and Design	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101A Project Management and Finance	4
		Elective 1 for Minor	4
Sub-total	**20**	**Sub-total**	**24**

Semester 3	Units	Semester 4	Units
RB2202 Kinematics and Dynamics for Robots	4	RB2203 Robot Control	4
RB2301 Robot Programming	4	RB3301 Introduction to Machine Intelligence	4
RB3302 Planning and Navigation	4	CDE2501 Liveable Cities	4
CE2407A Uncertainty Analysis of Engineers *	2	EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4
MA1511 Engineering Calculus *	2	EG2401A Engineering Professionalism	2
GE	4	CDE3301 Ideas to Proof-of-Concept	6
Elective 2 for Minor	4		
Sub-total	**24**	**Sub-total**	**24**

Semester 5	Units	Semester 6	Units
RB4101A B.Eng. Dissertation	4	RB4101A B.Eng. Dissertation	4
Technical Elective 1	4	RB3303 Robotic System Design and Application	4
Technical Elective 2	4	Technical Elective 3	4
CDE3301 Ideas to Proof-of-Concept	6	Technical Elective 4	4
Sub-total	**18**	**Sub-total**	**16**

* Students who are exempted from MA1301 can take CE2407A and MA1511 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 4 July 2025)