NUS Innovation & Design Programme
College of Design and Engineering

Bachelor of Engineering (Biomedical Engineering) 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
BN4101 B.Eng. Dissertation (over 2 consecutive semesters) [4]	8
Sub-total for Common Curriculum	**60**
Engineering Core	
MA1511 Engineering Calculus	2
MA1513 Linear Algebra with Differential Equations	2
CE2407A Uncertainty Analysis for Engineers	2
CE2407B Introduction to Numerical Methods for Engineers	2
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	
BN1111 Biomedical Engineering Principles and Practice I	4
BN2111 Biomedical Engineering Principles and Practice II	4
BN2102 Bioengineering Data Analysis	4
BN2201 Quantitative Physiology for Bioengineers	4
BN2204 Fundamentals of Biomechanics	4
BN2301 Biochemistry and Biomaterials for Bioengineers	4
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) [6]	4
Technical electives	8
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**

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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 BN4101 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 BN3101A Biomedical Engineering Design while 8 units are counted as unrestricted elective.

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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
BN1111 Biomedical Engineering Principles and Practice I	4	BN2111 Biomedical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design and Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	CE2407B Introduction to Numerical Methods for Engineers	2
PF1101 Fundamentals of Project Management	4	Group A/B course for Minor	4
Sub-total	**20**	**Sub-total**	**20**

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

Semester 3	Units	Semester 4	Units
CDE2501 Liveable Cities	4	BN2102 Bioengineering Data Analysis	4
BN2301 Biochemistry & Biomaterials for Bioengineers	4	BN2204 Fundamentals of Biomechanics	4
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4	ES2631 Critique and Communication of Thinking and Design	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	Additional technical course 1	4
EG2401A Engineering Professionalism	2	CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6
Group A/B course for Minor	4		
Sub-total	**22**	**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 BN3101A)	6	Additional technical course 3	4
BN2201 Quantitative Physiology for Bioengineers	4	GEC/GEN	4
Additional technical course 2	4	UE	4
GEC/GEN	4	UE	4
		UE	4
Sub-total	**18**	**Sub-total**	**20**

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Semester 7	Units	Semester 8	Units
BN4101 B.Eng. Dissertation	4	BN4101 B.Eng. Dissertation	4
Technical Elective 1	4	Technical Elective 2	4
UE	4	UE	4
UE	4		
Sub-total	**16**	**Sub-total**	**12**

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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
BN1111 Biomedical Engineering Principles and Practice I	4	BN2111 Biomedical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design and Make	4
MA1513 Linear Algebra with Differential Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for Engineers	2	CE2407B Introduction to Numerical Methods for Engineers	2
PF1101 Fundamentals of Project Management	4	Group A/B course for Minor	4
Sub-total	**20**	**Sub-total**	**20**

Semester 3	Units	Semester 4	Units
CDE2501 Liveable Cities	4	BN2102 Bioengineering Data Analysis	4
BN2301 Biochemistry & Biomaterials for Bioengineers	4	BN2204 Fundamentals of Biomechanics	4
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4	ES2631 Critique and Communication of Thinking and Design	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	Additional technical course 1	4
EG2401A Engineering Professionalism	2	CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6
Group A/B course for Minor	4		
Sub-total	**22**	**Sub-total**	**22**

Semester 5	Units	Semester 6	Units
CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6	EG3611A Industrial Attachment	10
BN2201 Quantitative Physiology for Bioengineers	4		
Additional technical course 2	4		
GEC/GEN	4		
GEC/GEN	4		
Sub-total	**22**	**Sub-total**	**10**

Semester 7	Units	Semester 8	Units
BN4101 B.Eng. Dissertation	4	BN4101 B.Eng. Dissertation	4
Technical Elective 1	4	Technical Elective 2	4
Additional technical course 3	4	UE	4
UE	4	UE	4
UE	4	UE	4
UE	4		
Sub-total	**24**	**Sub-total**	**20**

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Recommended semester schedule – JC-intake students or equivalent

(for students in Engineering Scholars Programme)

Semester 1	Units	Semester 2	Units
BN1111 Biomedical Engineering Principles and Practice I	4	BN2111 Biomedical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	BN2102 Bioengineering Data Analysis	4
DTK1234 Design Thinking	4	BN2204 Fundamentals of Biomechanics	4
CE2407A Uncertainty Analysis for Engineers	2	CE2407B Introduction to Numerical Methods for Engineers	2
MA1513 Linear Algebra with Differential Equations	2	UTCP course 2 (replaces GE)	4
PF1101 Fundamentals of Project Management	4	CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6
UTCP course 1 (replaces GE)	4	Group A/B course for Minor	4
Sub-total	**24**	**Sub-total**	**28**

Semester 3	Units	Semester 4 – NOC	Units
BN2201 Quantitative Physiology for Bioengineers	4		
BN2301 Biochemistry & Biomaterials for Bioengineers	4		
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4	NOC	
Additional technical course 1	4		
UTCP course 3 (replaces CDE2501)	4		
CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6		
Sub-total	**26**	**Sub-total**	**20**

Semester 5	MCs	Semester 6	MCs
BN4101 B.Eng. Dissertation	4	BN4101 B.Eng. Dissertation	4
Group A/B course for Minor	4	Technical Elective 1	4
UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4	Technical Elective 2	4
Additional technical course 2	4	Additional technical course 3	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence	4	UE	4
UE	4	UE	4
UE	2		
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)

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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
BN1111 Biomedical Engineering Principles and Practice I	4	BN2111 Biomedical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
PF1101 Fundamentals of Project Management	4	MA1511 Engineering Calculus	2
MA1301 Introductory Mathematics * (UE)	4	CE2407B Introduction to Numerical Methods for Engineers	2
Group A/B course for Minor	4	PC1201 Fundamentals of Physics (UE)	4
		CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6
		Group A/B course for Minor	4
Sub-total	**20**	**Sub-total**	**26**

Semester 3	Units	Semester 4	Units
CDE2501 Liveable Cities	4	BN2102 Bioengineering Data Analysis	4
BN2301 Biochemistry & Biomaterials for Bioengineers	4	BN2204 Fundamentals of Biomechanics	4
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4	ES2631 Critique and Communication of Thinking and Design	4
MA1513 Linear Algebra with Differential Equations *	2	Additional technical course 1	4
CE2407A Uncertainty Analysis for Engineers *	2	GEC/GEN	4
EG2401A Engineering Professionalism	2	GEC/GEN	4
CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6		
Sub-total	**24**	**Sub-total**	**24**

Semester 5	Units	Semester 6	Units
BN4101 B.Eng. Dissertation	4	BN4101 B.Eng. Dissertation	4
BN2201 Quantitative Physiology for Bioengineers	4	Technical Elective 1	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence *	4	Technical Elective 2	4
Additional technical course 2	4		
Additional technical course 3	4		
Sub-total	**20**	**Sub-total**	**12**

* Students who are exempted from MA1301 can take MA1513 and CE2407A in Semester 1 and EE2211/EE2213 in Semester 3.

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

- DTK1234 Design Thinking (4 units)
- EG1311 Design and Make (4 units)
- EG3611A Industrial Attachment (10 units)
- Unrestricted electives (20 units)

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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
BN1111 Biomedical Engineering Principles and Practice I	4	BN2111 Biomedical Engineering Principles and Practice II	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
PF1101 Fundamentals of Project Management	4	MA1511 Engineering Calculus	2
MA1301 Introductory Mathematics * (UE)	4	CE2407B Introduction to Numerical Methods for Engineers	2
GEC/GEN	4	PC1201 Fundamentals of Physics (UE)	4
		Group A/B course for Minor	4
Sub-total	**20**	**Sub-total**	**20**

Semester 3	Units	Semester 4	Units
CDE2501 Liveable Cities	4	BN2102 Bioengineering Data Analysis	4
BN2301 Biochemistry & Biomaterials for Bioengineers	4	BN2204 Fundamentals of Biomechanics	4
BN2403 Fundamentals of Biosignals Processing & Bioinstrumentation	4	ES2631 Critique and Communication of Thinking and Design	4
MA1513 Linear Algebra with Differential Equations *	2	Additional technical course 1	4
CE2407A Uncertainty Analysis for Engineers *	2	CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6
EG2401A Engineering Professionalism	2		
Group A/B course for Minor	4		
Sub-total	**22**	**Sub-total**	**22**

Semester 5	Units	Semester 6	Units
BN4101 B.Eng. Dissertation	4	BN4101 B.Eng. Dissertation	4
BN2201 Quantitative Physiology for Bioengineers	4	Technical Elective 1	4
EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence *	4	Technical Elective 2	4
Additional technical course 2	4	Additional technical course 3	4
CDE3301 Ideas to Proof-of-Concept (replaces BN3101A)	6	GEC/GEN	4
Sub-total	**22**	**Sub-total**	**20**

* Students who are exempted from MA1301 can take MA1513 and CE2407A in Semester 1 and EE2211/EE2213 in Semester 3.

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

- DTK1234 Design Thinking (4 units)
- EG1311 Design and Make (4 units)
- EG3611A Industrial Attachment (10 units)
- Unrestricted electives (20 units)

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