

**Bachelor of Engineering (Mechanical Engineering)  
with Second Major in Innovation & Design**

**Cohort AY2024/2025**

<b>Course Requirements</b>	<b>Units</b>
<b>Common Curriculum</b>	
GEA1000 Quantitative Reasoning with Data	4
CS1010E Programming Methodology	4
ES2631 Critique and Communication of Thinking and Design <sup>1</sup>	4
GE: Cultures and Connections <sup>1</sup>	4
GE: Singapore Studies <sup>1</sup>	4
GE: Communities and Engagement <sup>1</sup>	4
CDE2000 Creating Narratives	4
CDE2501 Liveable Cities	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning	4
EG1311 Design and Make	4
IE2141 Systems Thinking and Dynamics	4
PF1101 Fundamentals of Project Management	4
CDE4301 Innovation & Design Capstone <u>or</u> CDE4301A Ideas to Start-up (over 2 consecutive semesters) <sup>2</sup>	8
<b>Sub-total for Common Curriculum</b>	<b>60</b>
<b>Engineering Core</b>	
MA1505 Mathematics I	4
MA1512 Differential Equations for Engineering	2
MA1513 Linear Algebra with Differential Equations	2
EG2401A Engineering Professionalism	2
EG3611A Industrial Attachment <u>or</u> CFG2101 NUS Vacation Internship Programme <sup>3</sup> <u>and</u> EG3612 Vacation Industrial Attachment	10
<b>Sub-total for Engineering Core</b>	<b>20</b>
<b>Engineering Programme Requirements</b>	
ME1102 Engineering Principles and Practice I	4
ME2104 Engineering Principles and Practice II	4
ME2102 Engineering Innovation and Modelling	4
ME2112 Strength of Materials	4
ME2115 Mechanics of Machines	4
ME2121 Engineering Thermodynamics and Heat Transfer	4
ME2134 Fluids Mechanics I	4
ME2142 Feedback Control Systems	4
ME2162 Manufacturing Processes	4
Technical elective	4
<b>Sub-total for Engineering Programme Requirements</b>	<b>40</b>
<b>Unrestricted Electives</b>	
Group A course for Second Major	4
Group B course for Second Major	4
Group C courses for Second Major (Innovation & Enterprise electives)	8
CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters)	12
CDE4301 Innovation & Design Capstone <u>or</u> CDE4301A Ideas to Start-up (over 2 consecutive semesters) <sup>2</sup>	4
Other unrestricted electives	8
<b>Sub-total for Unrestricted Electives</b>	<b>40</b>
<b>Total</b>	<b>160</b>

**Innovation & Design Programme**  
**NUS 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> The 12 units for CDE4301/CDE4301A are counted towards 8 units for the Integrated Project requirement in the Common Curriculum while 4 units are counted as unrestricted elective.

The 12 units for CDE4301/CDE4301A will be fully counted as UE for students who are pursuing a specialisation with ME4101A B.Eng. Dissertation or ME4101B Mechanical Systems Design (8 units) as a compulsory requirement to fulfil Integrated Project.

- <sup>3</sup> May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	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
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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	Innovation & Enterprise Elective 1	4
ME2162 Manufacturing Processes	4	ME2115 Mechanics of Machines	4
GE	4	EG2401A Engineering Professionalism	2
GE	4	UE	4
		UE	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 2	4	Technical Elective	4
ME2142 Feedback Control Systems	4	CDE2000 Creating Narratives	4
<b>Sub-total</b>	<b>14</b>	<b>Sub-total</b>	<b>14</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	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
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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	Innovation & Enterprise Elective 1	4
ME2162 Manufacturing Processes	4	ME2115 Mechanics of Machines	4
GE	4	EG2401A Engineering Professionalism	2
GE	4	Specialisation course 1	4
		Specialisation course 2	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 2	4	Specialisation course 4	4
ME2142 Feedback Control Systems	4	Specialisation course 5	4
Specialisation course 3	4	CDE2000 Creating Narratives	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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
ME2115 Mechanics of Machines	4		
ME2162 Manufacturing Processes	4		
EG2401A Engineering Professionalism	2		
GE *	4		
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
ME2142 Feedback Control Systems	4	Technical Elective	4
GE *	4	CDE2000 Creating Narratives	4
UE	4	UE	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

\* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these courses earlier.

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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
Innovation & Enterprise Elective 1	4		
ME2115 Mechanics of Machines	4		
ME2162 Manufacturing Processes	4		
EG2401A Engineering Professionalism	2		
GE *	4		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 2	4	Specialisation course 3	4
ME2142 Feedback Control Systems	4	Specialisation course 4	4
Specialisation course 1	4	Specialisation course 5	4
Specialisation course 2	4	CDE2000 Creating Narratives	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

\* Students in UTCP and RVRC will need to overload in Semesters 2 to 4 in order to clear these courses earlier.

**Recommended semester schedule – JC-intake students or equivalent**  
(for students in year-long NOC programmes)

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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 – NOC	Units
CDE3301 Ideas to Proof-of-Concept	6	NOC	
ME2115 Mechanics of Machines	4		
ME2162 Manufacturing Processes	4		
GE	4		
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>22</b>

Semester 7 – NOC	Units	Semester 8	Units
NOC		ME2142 Feedback Control Systems	4
		Technical Elective	4
		CDE2000 Creating Narratives	4
		GE	4
		UE	2
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>18</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

A year-long NOC programme comprises the following courses:

- ETP3206L Innovation & Enterprise Internship (16 units) – replaces EG3611A (10 units), EG2401A (2 units), and UE (4 units)
- ETP3202L Innovation & Enterprise Case Study & Analysis (8 units) – replaces CDE4301A (8 units out of 12 units)
- ETP3203L Innovation & Enterprise Internship Practicum (8 units) – replaces CDE4301A (4 units out of 12 units) and UE (4 units)

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- ETP2271 Discovering Resilience and Purpose (2 units) – counted as UE (2 units)
- Entrepreneurship courses (4 or 8 units) – replaces Innovation & Enterprise electives (up to 8 units – students will need to complete additional Innovation & Enterprise Electives in NUS if they are unable to complete 8 units of entrepreneurship courses during NOC)



**Recommended semester schedule – JC-intake students or equivalent**  
(for students in one-semester NOC programmes)

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
EG1311 Design & Make	4	DTK1234 Design Thinking	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
GE	4	MA1513 Linear Algebra with Differential Equations	2
		PF1101 Fundamentals of Project Management	4
		Group A/B course for Second Major ^	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>24</b>

Semester 3	Units	Semester 4	Units
ME2112 Strength of Materials	4	CDE2501 Liveable Cities	4
ME2134 Fluids Mechanics I	4	EE2211 Introduction to Machine Learning	4
ES2631 Critique and Communication of Thinking and Design	4	ME2102 Engineering Innovation and Modelling	4
IE2141 Systems Thinking & Dynamics	4	ME2121 Engineering Thermodynamics and Heat Transfer	4
Group A/B course for Second Major ^	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 – NOC	Units
CDE3301 Ideas to Proof-of-Concept	6	NOC	
ME2115 Mechanics of Machines	4		
ME2162 Manufacturing Processes	4		
GE	4		
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>22</b>

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
ME2142 Feedback Control Systems	4	Technical Elective	4
GE	4	CDE2000 Creating Narratives	4
UE	4	UE	2
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>16</b>

^ Students can only take CDE2310 or CDE2301 in Semester 2. Those who wish to take CDE2300 (in lieu of CDE2310) and CDE2311/CDE2605R/CDE2606B (in lieu of CDE2301) may clear both courses concurrently in Semester 3.

A one-semester NOC programme comprises the following courses:

- ETP3201L Innovation & Enterprise Internship (12 units) – replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (4 units) – replaces Innovation & Enterprise Elective 1 (4 units)
- Entrepreneurship course (4 units) – replaces Innovation & Enterprise Elective 2 (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) – counted as UE (2 units)

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
ME2102 Engineering Innovation and Modelling	4	ME2134 Fluids Mechanics I	4
MA1512 Differential Equations for Engineering	2	GEA1000 Quantitative Reasoning with Data	4
MA1513 Linear Algebra with Differential Equations	2	DTK1234 Design Thinking	4
UTCP course 1 (replaces GE)	4	UTCP course 2 (replaces GE)	4
Group B course for Second Major	4	CDE3301 Ideas to Proof-of-Concept	6
UE	4		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>26</b>

Semester 3	Units	Semester 4 – NOC	Units
ME2112 Strength of Materials	4	NOC	
ME2121 Engineering Thermodynamics and Heat Transfer	4		
ME2162 Manufacturing Processes	4		
UTCP course 3 (replaces GE)	4		
CDE3301 Ideas to Proof-of-Concept	6		
Group A course for Second Major	4		
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
ME2115 Mechanics of Machines	4	CDE2000 Creating Narratives	4
ME2142 Feedback Control Systems	4	CDE2501 Liveable Cities	4
Technical Elective	4	EE2211 Introduction to Machine Learning	4
UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4	PF1101 Fundamentals of Project Management	4
UE (or IE2141 Systems Thinking & Dynamics if not in RC4)	4	UE	2
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>24</b>

Students are highly encouraged to complete the following courses before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 units)
- EG1311 Design & Make (4 units)
- MA1505 Mathematics I (4 units)

A one-semester NOC programme comprises the following courses:

- ETP3201L Innovation & Enterprise Internship (12 units) – replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (4 units) – replaces Innovation & Enterprise Elective 1 (4 units)
- Entrepreneurship course (4 units) – replaces Innovation & Enterprise Elective 2 (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) – counted as UE (2 units)

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

Semester 1	Units	Semester 2	Units
ME1102 Engineering Principles and Practice I	4	ME2104 Engineering Principles and Practice II	4
ME2102 Engineering Innovation and Modelling	4	ME2112 Strength of Materials	4
CS1010E Programming Methodology	4	GEA1000 Quantitative Reasoning with Data	4
MA1301 Introductory Mathematics * (UE)	4	MA1512 Differential Equations for Engineering	2
Group A/B course for Second Major	4	MA1513 Linear Algebra with Differential Equations	2
		CDE3301 Ideas to Proof-of-Concept	6
		Group A/B course for Second Major	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>26</b>

Semester 3	Units	Semester 4	Units
MA1505 Mathematics I *	4	CDE2501 Liveable Cities	4
ME2115 Mechanics of Machines	4	EE2211 Introduction to Machine Learning	4
ME2121 Engineering Thermodynamics and Heat Transfer	4	ME2134 Fluids Mechanics I	4
ES2631 Critique and Communication of Thinking and Design	4	ME2162 Manufacturing Processes	4
IE2141 Systems Thinking & Dynamics	4	EG2401A Engineering Professionalism	2
CDE3301 Ideas to Proof-of-Concept	6	PF1101 Fundamentals of Project Management	4
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
ME2142 Feedback Control Systems	4	Technical Elective	4
GE	4	CDE2000 Creating Narratives	4
GE	4	GE	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>22</b>

\* Students who are exempted from MA1301 can take MA1505 in Semester 1.

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

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