

**Bachelor of Engineering (Robotics & Machine Intelligence)  
with Second Major in Innovation & Design**

**Cohort AY2025/2026**

| Course Requirements                                                                                                                  | Units      |
|--------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Common Curriculum</b>                                                                                                             |            |
| GEA1000 Quantitative Reasoning with Data <sup>1</sup>                                                                                | 4          |
| CS1010E Programming Methodology (or other variants) <sup>2</sup>                                                                     | 4          |
| CDE2501 Sustainable Systems for Liveable Cities <sup>2</sup>                                                                         | 4          |
| ES2631 Critique and Communication of Thinking and Design <sup>2</sup>                                                                | 4          |
| GE: Cultures and Connections <sup>2</sup>                                                                                            | 4          |
| GE: Communities and Engagement <sup>2</sup>                                                                                          | 4          |
| DTK1234 Design Thinking                                                                                                              | 4          |
| EE2211 Introduction to Machine Learning<br>or EE2213 Introduction to Artificial Intelligence                                         | 4          |
| EG1311 Design and Make or EG1311BE Design and Make                                                                                   | 4          |
| PF1101A Project Management and Finance                                                                                               | 4          |
| <b>Sub-total for Common Curriculum</b>                                                                                               | <b>40</b>  |
| <b>Engineering Core</b>                                                                                                              |            |
| 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<br>CFG2101 NUS Vacation Internship Programme <sup>3</sup> and EG3612 Vacation Industrial Attachment | 10         |
| <b>Sub-total for Engineering Core</b>                                                                                                | <b>20</b>  |
| <b>Engineering Programme Requirements</b>                                                                                            |            |
| 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         |
| CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up<br>(over 2 consecutive semesters) <sup>4</sup>                    | 8          |
| <b>Sub-total for Engineering Programme Requirements</b>                                                                              | <b>60</b>  |
| <b>Unrestricted Electives</b>                                                                                                        |            |
| CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) <sup>5</sup>                                                        | 12         |
| CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up<br>(over 2 consecutive semesters) <sup>4</sup>                    | 4          |
| Electives for Second Major <sup>5</sup>                                                                                              | 16         |
| Other unrestricted electives                                                                                                         | 8          |
| <b>Sub-total for Unrestricted Electives</b>                                                                                          | <b>40</b>  |
| <b>Total</b>                                                                                                                         | <b>160</b> |

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Notes:

- <sup>1</sup> Students may read other approved courses for Data Literacy in lieu of GEA1000.
- <sup>2</sup> 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.
- <sup>3</sup> May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).
- <sup>4</sup> The 12 units for CDE4301/CDE4301A are counted towards 8 units for Integrated Project while 4 units are counted as unrestricted elective.
- <sup>5</sup> Students should clear at least one elective course from List I prior to CDE3301. 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).

**Sample study plan – 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<br>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 Second Major (from List I)         | 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     |
|-------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------|-----------|
| 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 Sustainable Systems for 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 Second Major (from List I)                                                 | 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         | Elective 3 for Second Major                  | 4         |
| Technical Elective 1                | 4         | RB3301 Introduction to Machine Intelligence  | 4         |
| EG2401A Engineering Professionalism | 2         | RB3303 Robotic System Design and Application | 4         |
| GE                                  | 4         | Technical Elective 2                         | 4         |
| UE                                  | 4         | UE                                           | 4         |
| <b>Sub-total</b>                    | <b>20</b> | <b>Sub-total</b>                             | <b>20</b> |

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| <b>Semester 7</b>                                                            | <b>Units</b> | <b>Semester 8</b>                                                            | <b>Units</b> |
|------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------|--------------|
| CDE4301 Innovation & Design Capstone<br><u>or</u> CDE4301A Ideas to Start-up | 6            | CDE4301 Innovation & Design Capstone<br><u>or</u> CDE4301A Ideas to Start-up | 6            |
| Elective 4 for Second Major                                                  | 4            | Technical Elective 4                                                         | 4            |
| Technical Elective 3                                                         | 4            |                                                                              |              |
| <b>Sub-total</b>                                                             | <b>14</b>    | <b>Sub-total</b>                                                             | <b>10</b>    |

**Sample study plan – 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<br>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 Second Major (from List I)         | 4         |
| <b>Sub-total</b>                                      | <b>20</b> | <b>Sub-total</b>                                  | <b>24</b> |

| 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 Sustainable Systems for 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 Second Major (from List I)                                                 | 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        |
| Elective 3 for Second Major         | 4         |                               |           |
| EG2401A Engineering Professionalism | 2         |                               |           |
| GE                                  | 4         |                               |           |
| UE                                  | 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<br>or CDE4301A Ideas to Start-up | 6         | CDE4301 Innovation & Design Capstone<br>or CDE4301A Ideas to Start-up | 6         |
| Elective 4 for Second Major                                           | 4         | RB3301 Introduction to Machine Intelligence                           | 4         |
| Technical Elective 1                                                  | 4         | RB3303 Robotic System Design and Application                          | 4         |
| Technical Elective 2                                                  | 4         | Technical Elective 3                                                  | 4         |
| UE                                                                    | 4         | Technical Elective 4                                                  | 4         |
| <b>Sub-total</b>                                                      | <b>22</b> | <b>Sub-total</b>                                                      | <b>22</b> |

**Sample study plan – JC-intake students or equivalent**  
(for students in year-long NOC programmes)

| 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<br>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 Second Major (from List I)         | 4         |
| <b>Sub-total</b>                                      | <b>20</b> | <b>Sub-total</b>                                  | <b>24</b> |

| 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 Sustainable Systems for 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 Second Major (from List I)                                                 | 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              |           |
| Technical Elective 1              | 4         |                  |           |
| Technical Elective 2              | 4         |                  |           |
| GE                                | 4         |                  |           |
| <b>Sub-total</b>                  | <b>18</b> | <b>Sub-total</b> | <b>20</b> |

| Semester 7 – NOC | Units     | Semester 8                                   | Units     |
|------------------|-----------|----------------------------------------------|-----------|
| NOC              |           | RB3301 Introduction to Machine Intelligence  | 4         |
|                  |           | RB3303 Robotic System Design and Application | 4         |
|                  |           | Technical Elective 3                         | 4         |
|                  |           | Technical Elective 4                         | 4         |
| <b>Sub-total</b> | <b>20</b> | <b>Sub-total</b>                             | <b>16</b> |

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A year-long NOC programme comprises the following courses (up to 40 units):

- 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)
- Entrepreneurship courses (up to 8 units) – replaces Electives 3 and 4 for Second Major (students will need to complete Electives 3 and/or 4 for Second Major in NUS if they are unable to complete 8 units of entrepreneurship courses during NOC)

**Sample study plan – JC-intake students or equivalent**  
(for students in one-semester NOC programmes)

| 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<br>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 Second Major (from List I)         | 4         |
| <b>Sub-total</b>                                      | <b>20</b> | <b>Sub-total</b>                                  | <b>24</b> |

| 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 Sustainable Systems for 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 Second Major (from List I)                                                 | 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              |           |
| UE                                | 4         |                  |           |
| UE                                | 4         |                  |           |
| GE                                | 4         |                  |           |
| <b>Sub-total</b>                  | <b>18</b> | <b>Sub-total</b> | <b>20</b> |

| Semester 7                                                            | Units     | Semester 8                                                            | Units     |
|-----------------------------------------------------------------------|-----------|-----------------------------------------------------------------------|-----------|
| CDE4301 Innovation & Design Capstone<br>or CDE4301A Ideas to Start-up | 6         | CDE4301 Innovation & Design Capstone<br>or CDE4301A Ideas to Start-up | 6         |
| Technical Elective 1                                                  | 4         | RB3301 Introduction to Machine Intelligence                           | 4         |
| Technical Elective 2                                                  | 4         | RB3303 Robotic System Design and Application                          | 4         |
| Technical Elective 3                                                  | 4         | Technical Elective 4                                                  | 4         |
| <b>Sub-total</b>                                                      | <b>18</b> | <b>Sub-total</b>                                                      | <b>18</b> |

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 (Short) (4 units) – replaces Elective 3 for Second Major (4 units)
- Entrepreneurship course (4 units) – replaces Elective 4 for Second Major (4 units)



**Sample study plan – JC-intake students or equivalent**

(for students in Engineering Scholars Programme who plan to go for SEP)

| 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         |
| PF1101A Project Management and Finance    | 4         | DTK1234 Design Thinking                           | 4         |
| RVRC/UTCP course 1 (replaces GE)          | 4         | MA1512 Differential Equations for Engineering     | 2         |
| Elective 1 for Second Major (from List I) | 4         | MA1513 Linear Algebra with Differential Equations | 2         |
| UE                                        | 4         | RVRC/UTCP course 2 (replaces GE)                  | 4         |
| UE                                        | 2         | CDE3301 Ideas to Proof-of-Concept                 | 6         |
| <b>Sub-total</b>                          | <b>24</b> | <b>Sub-total</b>                                  | <b>26</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 – 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         | RVRC/UTCP course 4 (replaces ES2631)              | 4         |
| RVRC/UTCP course 3 (replaces CDE2501)     | 4         | Elective 3 for Second Major                       | 4         |
| Elective 2 for Second Major (from List I) | 4         | Elective 4 for Second Major                       | 4         |
| CDE3301 Ideas to Proof-of-Concept         | 6         |                                                   |           |
| <b>Sub-total</b>                          | <b>26</b> | <b>Sub-total</b>                                  | <b>20</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                                                         | Units     |
|-------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------|-----------|
| CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up                        | 6         | CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up | 6         |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4         | RB3301 Introduction to Machine Intelligence                        | 4         |
| Technical Elective 1                                                                      | 4         | RB3303 Robotic System Design and Application                       | 4         |
| Technical Elective 2                                                                      | 4         | Technical Elective 3                                               | 4         |
| EG2401A Engineering Professionalism                                                       | 2         | Technical Elective 4                                               | 4         |
| <b>Sub-total</b>                                                                          | <b>20</b> | <b>Sub-total</b>                                                   | <b>22</b> |

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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)

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

**Sample study plan – JC-intake students or equivalent**

(for students in Engineering Scholars Programme who plan to go for one-semester NOC programmes)

| <b>Semester 1</b>                         | <b>Units</b> | <b>Semester 2</b>                                 | <b>Units</b> |
|-------------------------------------------|--------------|---------------------------------------------------|--------------|
| RB1101 Fundamentals of Robotics I         | 4            | RB2101 Fundamentals of Robotics II                | 4            |
| CE2407A Uncertainty Analysis of Engineers | 2            | GEA1000 Quantitative Reasoning with Data          | 4            |
| PF1101A Project Management and Finance    | 4            | DTK1234 Design Thinking                           | 4            |
| RVRC/UTCP course 1 (replaces GE)          | 4            | MA1512 Differential Equations for Engineering     | 2            |
| Elective 1 for Second Major (from List I) | 4            | MA1513 Linear Algebra with Differential Equations | 2            |
| UE                                        | 4            | RVRC/UTCP course 2 (replaces GE)                  | 4            |
| UE                                        | 2            | CDE3301 Ideas to Proof-of-Concept                 | 6            |
| <b>Sub-total</b>                          | <b>24</b>    | <b>Sub-total</b>                                  | <b>26</b>    |

| <b>Semester 3</b>                         | <b>Units</b> | <b>Semester 4 – NOC</b> | <b>Units</b> |
|-------------------------------------------|--------------|-------------------------|--------------|
| RB2202 Kinematics and Dynamics for Robots | 4            | NOC                     |              |
| RB2301 Robot Programming                  | 4            |                         |              |
| RB3302 Planning and Navigation            | 4            |                         |              |
| RVRC/UTCP course 3 (replaces CDE2501)     | 4            |                         |              |
| Elective 2 for Second Major (from List I) | 4            |                         |              |
| CDE3301 Ideas to Proof-of-Concept         | 6            |                         |              |
| <b>Sub-total</b>                          | <b>26</b>    | <b>Sub-total</b>        | <b>20</b>    |

| <b>Semester 5</b>                                                                         | <b>Units</b> | <b>Semester 6</b>                                                  | <b>Units</b> |
|-------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------|--------------|
| CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up                        | 6            | CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up | 6            |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4            | RB2203 Robot Control                                               | 4            |
| Technical Elective 1                                                                      | 4            | RB2302 Fundamentals of Artificial Neural Networks                  | 4            |
| Technical Elective 2                                                                      | 4            | RB3301 Introduction to Machine Intelligence                        | 4            |
| Technical Elective 3                                                                      | 4            | RB3303 Robotic System Design and Application                       | 4            |
| RVRC/UTCP course 4 (replaces ES2631)                                                      | 4            | Technical Elective 4                                               | 4            |
| <b>Sub-total</b>                                                                          | <b>26</b>    | <b>Sub-total</b>                                                   | <b>26</b>    |

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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)

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 (Short) (4 units) – replaces Elective 3 for Second Major (4 units)
- Entrepreneurship course (4 units) – replaces Elective 4 for Second Major (4 units)

Sample study plan – poly-intake students

| 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         |
| PC1201 Fundamentals of Physics ^ (UE)     | 4         | MA1512 Differential Equations for Engineering     | 2         |
| Elective 1 for Second Major (from List I) | 4         | MA1513 Linear Algebra with Differential Equations | 2         |
|                                           |           | PF1101A Project Management and Finance            | 4         |
|                                           |           | CDE3301 Ideas to Proof-of-Concept                 | 6         |
| <b>Sub-total</b>                          | <b>20</b> | <b>Sub-total</b>                                  | <b>26</b> |

| 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 Sustainable Systems for 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 Second Major (from List I)   | 4         | ES2631 Critique and Communication of Thinking and Design                                  | 4         |
| CDE3301 Ideas to Proof-of-Concept           | 6         | GE ^                                                                                      | 4         |
| <b>Sub-total</b>                            | <b>26</b> | <b>Sub-total</b>                                                                          | <b>26</b> |

| Semester 5                                                         | Units     | Semester 6                                                         | Units     |
|--------------------------------------------------------------------|-----------|--------------------------------------------------------------------|-----------|
| CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up | 6         | CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up | 6         |
| Elective 3 for Second Major                                        | 4         | Elective 4 for Second Major                                        | 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         |
| <b>Sub-total</b>                                                   | <b>22</b> | <b>Sub-total</b>                                                   | <b>22</b> |

\* Students who are exempted from MA1301 can take CE2407A and MA1511 in Semester 1.

^ 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)