

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

**Cohort AY2023/2024**

| <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            |
| CN4118 B.Eng. Dissertation or CN4119 Final Year Design Project (over 2 consecutive semesters) <sup>2</sup>                        | 8            |
| <b>Sub-total for Common Curriculum</b>                                                                                            | <b>60</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 for Engineers                                                                                        | 2            |
| EG2401A Engineering Professionalism                                                                                               | 2            |
| EG3611A Industrial Attachment or 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>                                                                                         |              |
| CN1101A Chemical Engineering Principles and Practice I                                                                            | 4            |
| CN2102 Chemical Engineering Principles and Practice II                                                                            | 4            |
| CN2103 Mass and Energy Balance                                                                                                    | 4            |
| CN2104 Chemical Engineering Thermodynamics                                                                                        | 4            |
| CN2105 Reaction Engineering                                                                                                       | 4            |
| CN2106 Fluid Mechanics and Heat Transfer                                                                                          | 4            |
| CN3103 Mass Transfer and Separation Processes                                                                                     | 4            |
| CN3104 Computer-Aided Chemical Process Simulation                                                                                 | 4            |
| CN4101 Process Control and Safety                                                                                                 | 4            |
| CN4102 Chemical Engineering Lab                                                                                                   | 4            |
| <b>Sub-total for Engineering Programme Requirements</b>                                                                           | <b>40</b>    |
| <b>Unrestricted Electives</b>                                                                                                     |              |
| Group A course for Minor                                                                                                          | 4            |
| Group B course for Minor                                                                                                          | 4            |
| CDE3301/EG3301R Ideas to Proof-of-Concept (over 2 consecutive semesters)                                                          | 12           |
| Other unrestricted electives <sup>2</sup>                                                                                         | 20           |
| <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> Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of CN4118/CN4119 and 4 units of unrestricted electives.
- <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     |
|--------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| CN1101A Chemical Engineering Principles and Practice I | 4         | CN2102 Chemical Engineering Principles and Practice II | 4         |
| GEA1000 Quantitative Reasoning with Data               | 4         | CS1010E Programming Methodology                        | 4         |
| DTK1234 Design Thinking                                | 4         | EG1311 Design & Make                                   | 4         |
| MA1513 Linear Algebra with Differential Equations      | 2         | MA1511 Engineering Calculus                            | 2         |
| CE2407A Uncertainty Analysis for Engineers             | 2         | MA1512 Differential Equations for Engineering          | 2         |
| PF1101 Fundamentals of Project Management              | 4         | Group A/B course for Minor                             | 4         |
| <b>Sub-total</b>                                       | <b>20</b> | <b>Sub-total</b>                                       | <b>20</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     |
|--------------------------------------------|-----------|----------------------------------------------------------|-----------|
| CN2103 Mass & Energy Balance               | 4         | CN2105 Reaction Engineering                              | 4         |
| CN2104 Chemical Engineering Thermodynamics | 4         | CN2106 Fluid Mechanics & Heat Transfer                   | 4         |
| CDE2501 Liveable Cities                    | 4         | IE2141 Systems Thinking & Dynamics                       | 4         |
| EE2211 Introduction to Machine Learning    | 4         | ES2631 Critique and Communication of Thinking and Design | 4         |
| Group A/B course for Minor                 | 4         | CDE3301/EG3301R 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/EG3301R Ideas to Proof-of-Concept         | 6         | GE                               | 4         |
| CN3103 Mass Transfer and Separation Processes     | 4         | GE                               | 4         |
| CN3104 Computer-Aided Chemical Process Simulation | 4         | GE                               | 4         |
| EG2401A Engineering Professionalism               | 2         | UE                               | 4         |
| CDE2000 Creating Narratives                       | 4         | UE                               | 4         |
| <b>Sub-total</b>                                  | <b>20</b> | <b>Sub-total</b>                 | <b>20</b> |

| Semester 7                                                               | Units     | Semester 8                                                               | Units     |
|--------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         | CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         |
| CN4101 Process Control and Safety                                        | 4         | CN4102 Chemical Engineering Lab                                          | 4         |
| UE                                                                       | 4         | UE                                                                       | 4         |
| UE                                                                       | 4         |                                                                          |           |
| <b>Sub-total</b>                                                         | <b>16</b> | <b>Sub-total</b>                                                         | <b>12</b> |

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

| Semester 1                                             | Units     | Semester 2                                             | Units     |
|--------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| CN1101A Chemical Engineering Principles and Practice I | 4         | CN2102 Chemical Engineering Principles and Practice II | 4         |
| GEA1000 Quantitative Reasoning with Data               | 4         | CS1010E Programming Methodology                        | 4         |
| DTK1234 Design Thinking                                | 4         | EG1311 Design & Make                                   | 4         |
| MA1513 Linear Algebra with Differential Equations      | 2         | MA1511 Engineering Calculus                            | 2         |
| CE2407A Uncertainty Analysis for Engineers             | 2         | MA1512 Differential Equations for Engineering          | 2         |
| PF1101 Fundamentals of Project Management              | 4         | Group A/B course for Minor                             | 4         |
| <b>Sub-total</b>                                       | <b>20</b> | <b>Sub-total</b>                                       | <b>20</b> |

| Semester 3                                 | Units     | Semester 4                                               | Units     |
|--------------------------------------------|-----------|----------------------------------------------------------|-----------|
| CN2103 Mass & Energy Balance               | 4         | CN2105 Reaction Engineering                              | 4         |
| CN2104 Chemical Engineering Thermodynamics | 4         | CN2106 Fluid Mechanics & Heat Transfer                   | 4         |
| CDE2501 Liveable Cities                    | 4         | IE2141 Systems Thinking & Dynamics                       | 4         |
| EE2211 Introduction to Machine Learning    | 4         | ES2631 Critique and Communication of Thinking and Design | 4         |
| Group A/B course for Minor                 | 4         | CDE3301/EG3301R 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/EG3301R Ideas to Proof-of-Concept         | 6         | EG3611A Industrial Attachment | 10        |
| CN3103 Mass Transfer and Separation Processes     | 4         |                               |           |
| CN3104 Computer-Aided Chemical Process Simulation | 4         |                               |           |
| EG2401A Engineering Professionalism               | 2         |                               |           |
| CDE2000 Creating Narratives                       | 4         |                               |           |
| GE *                                              | 4         |                               |           |
| <b>Sub-total</b>                                  | <b>24</b> | <b>Sub-total</b>              | <b>10</b> |

| Semester 7                                                               | Units     | Semester 8                                                               | Units     |
|--------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         | CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         |
| CN4101 Process Control and Safety                                        | 4         | CN4102 Chemical Engineering Lab                                          | 4         |
| GE *                                                                     | 4         | UE                                                                       | 4         |
| GE *                                                                     | 4         | UE                                                                       | 4         |
| UE                                                                       | 4         | UE                                                                       | 4         |
| UE                                                                       | 4         |                                                                          |           |
| <b>Sub-total</b>                                                         | <b>24</b> | <b>Sub-total</b>                                                         | <b>20</b> |

\* 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 Engineering Scholars Programme)

| Semester 1                                             | Units     | Semester 2                                             | Units     |
|--------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| CN1101A Chemical Engineering Principles and Practice I | 4         | CN2102 Chemical Engineering Principles and Practice II | 4         |
| CN2103 Mass & Energy Balance                           | 4         | CN2104 Chemical Engineering Thermodynamics             | 4         |
| GEA1000 Quantitative Reasoning with Data               | 4         | MA1512 Differential Equations for Engineering          | 2         |
| DTK1234 Design Thinking                                | 4         | PF1101 Fundamentals of Project Management              | 4         |
| MA1513 Linear Algebra with Differential Equations      | 2         | UTCP course 2 (replaces GE)                            | 4         |
| CE2407A Uncertainty Analysis for Engineers             | 2         | CDE3301/EG3301R Ideas to Proof-of-Concept              | 6         |
| UTCP course 1 (replaces GE)                            | 4         | Group A/B course for Minor                             | 4         |
| <b>Sub-total</b>                                       | <b>24</b> | <b>Sub-total</b>                                       | <b>28</b> |

| Semester 3                                    | Units     | Semester 4 – NOC | Units     |
|-----------------------------------------------|-----------|------------------|-----------|
| CDE2501 Liveable Cities                       | 4         | NOC              |           |
| CN2105 Reaction Engineering                   | 4         |                  |           |
| CN2106 Fluid Mechanics & Heat Transfer        | 4         |                  |           |
| CN3103 Mass Transfer and Separation Processes | 4         |                  |           |
| UTCP course 3 (replaces GE)                   | 4         |                  |           |
| CDE3301/EG3301R Ideas to Proof-of-Concept     | 6         |                  |           |
| <b>Sub-total</b>                              | <b>26</b> | <b>Sub-total</b> | <b>22</b> |

| Semester 5                                                                        | Units     | Semester 6                                                               | Units     |
|-----------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project          | 4         | CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         |
| Group A/B course for Minor                                                        | 4         | CN4101 Process Control and Safety                                        | 4         |
| UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design) | 4         | CN4102 Chemical Engineering Lab                                          | 4         |
| CDE2000 Creating Narratives                                                       | 4         | UE                                                                       | 4         |
| CN3104 Computer-Aided Chemical Process Simulation                                 | 4         | UE                                                                       | 4         |
| EE2211 Introduction to Machine Learning                                           | 4         | UE (or IE2141 Systems Thinking & Dynamics if not in RC4)                 | 4         |
| <b>Sub-total</b>                                                                  | <b>24</b> | <b>Sub-total</b>                                                         | <b>24</b> |

Students must 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) – replaces MA511 Engineering Calculus (2 units) and counted as UE (2 units)

**Innovation & Design Programme**  
**NUS College of Design and Engineering**

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) – counted as UE (4 units)
- Entrepreneurship course (4 units) – counted as UE (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) – counted as UE (2 units)

**Recommended semester schedule – poly-intake students**  
(for students who may want to upgrade to a Second Major)

| Semester 1                                             | Units     | Semester 2                                             | Units     |
|--------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| CN1101A Chemical Engineering Principles and Practice I | 4         | CN2102 Chemical 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         | MA1512 Differential Equations for Engineering          | 2         |
| Group A/B course for Minor                             | 4         | CDE3301/EG3301R Ideas to Proof-of-Concept              | 6         |
|                                                        |           | Group A/B course for Minor                             | 4         |
| <b>Sub-total</b>                                       | <b>20</b> | <b>Sub-total</b>                                       | <b>22</b> |

| Semester 3                                          | Units     | Semester 4                                               | Units     |
|-----------------------------------------------------|-----------|----------------------------------------------------------|-----------|
| CN2103 Mass & Energy Balance                        | 4         | CN2105 Reaction Engineering                              | 4         |
| CN2104 Chemical Engineering Thermodynamics          | 4         | CN2106 Fluid Mechanics & Heat Transfer                   | 4         |
| MA1513 Linear Algebra with Differential Equations * | 2         | IE2141 Systems Thinking & Dynamics                       | 4         |
| CE2407A Uncertainty Analysis for Engineers *        | 2         | ES2631 Critique and Communication of Thinking and Design | 4         |
| CDE2000 Creating Narratives                         | 4         | GE                                                       | 4         |
| CDE2501 Liveable Cities                             | 4         | GE                                                       | 4         |
| CDE3301/EG3301R Ideas to Proof-of-Concept           | 6         |                                                          |           |
| <b>Sub-total</b>                                    | <b>26</b> | <b>Sub-total</b>                                         | <b>24</b> |

| Semester 5                                                               | Units     | Semester 6                                                               | Units     |
|--------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         | CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         |
| CN3103 Mass Transfer and Separation Processes                            | 4         | CN4102 Chemical Engineering Lab                                          | 4         |
| CN3104 Computer-Aided Chemical Process Simulation                        | 4         | GE                                                                       | 4         |
| CN4101 Process Control and Safety                                        | 4         | EG2401A Engineering Professionalism                                      | 2         |
| EE2211 Introduction to Machine Learning                                  | 4         |                                                                          |           |
| <b>Sub-total</b>                                                         | <b>20</b> | <b>Sub-total</b>                                                         | <b>14</b> |

\* Students who are exempted from MA1301 can take MA1513 and CE2407A 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)

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

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

| Semester 1                                             | Units     | Semester 2                                             | Units     |
|--------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| CN1101A Chemical Engineering Principles and Practice I | 4         | CN2102 Chemical 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         | MA1512 Differential Equations for Engineering          | 2         |
| GE                                                     | 4         | GE                                                     | 4         |
|                                                        |           | Group A/B course for Minor                             | 4         |
| <b>Sub-total</b>                                       | <b>20</b> | <b>Sub-total</b>                                       | <b>20</b> |

| Semester 3                                          | Units     | Semester 4                                               | Units     |
|-----------------------------------------------------|-----------|----------------------------------------------------------|-----------|
| CN2103 Mass & Energy Balance                        | 4         | CN2105 Reaction Engineering                              | 4         |
| CN2104 Chemical Engineering Thermodynamics          | 4         | CN2106 Fluid Mechanics & Heat Transfer                   | 4         |
| MA1513 Linear Algebra with Differential Equations * | 2         | IE2141 Systems Thinking & Dynamics                       | 4         |
| CE2407A Uncertainty Analysis for Engineers *        | 2         | ES2631 Critique and Communication of Thinking and Design | 4         |
| CDE2000 Creating Narratives                         | 4         | CDE3301/EG3301R Ideas to Proof-of-Concept                | 6         |
| CDE2501 Liveable Cities                             | 4         |                                                          |           |
| Group A/B course for Minor                          | 4         |                                                          |           |
| <b>Sub-total</b>                                    | <b>24</b> | <b>Sub-total</b>                                         | <b>22</b> |

| Semester 5                                                               | Units     | Semester 6                                                               | Units     |
|--------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         | CN4118 B.Eng. Dissertation <u>or</u><br>CN4119 Final Year Design Project | 4         |
| CN3103 Mass Transfer and Separation Processes                            | 4         | CN4102 Chemical Engineering Lab                                          | 4         |
| CN3104 Computer-Aided Chemical Process Simulation                        | 4         | GE                                                                       | 4         |
| CN4101 Process Control and Safety                                        | 4         | EG2401A Engineering Professionalism                                      | 2         |
| EE2211 Introduction to Machine Learning                                  | 4         |                                                                          |           |
| CDE3301/EG3301R Ideas to Proof-of-Concept                                | 6         |                                                                          |           |
| <b>Sub-total</b>                                                         | <b>26</b> | <b>Sub-total</b>                                                         | <b>14</b> |

\* Students who are exempted from MA1301 can take MA1513 and CE2407A 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)