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

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

## Cohort AY2024/2025

| Course Requirements | Units |
|---|---|
| **Common Curriculum** | |
| GEA1000 Quantitative Reasoning with Data | 4 |
| CS1010E Programming Methodology | 4 |
| ES2631 Critique and Communication of Thinking and Design [1] | 4 |
| GEC: Cultures and Connections [1] | 4 |
| GEN: Communities and Engagement [1] | 4 |
| CDE2501 Liveable Cities [1, 2] | 4 |
| DTK1234 Design Thinking | 4 |
| EE2211 Introduction to Machine Learning<br>or EE2213 Introduction to Artificial Intelligence | 4 |
| EG1311 Design and Make | 4 |
| PF1101 Fundamentals of Project Management<br>or PF1101A Project Management and Finance | 4 |
| Additional technical courses for Engineering major [3] | 12 |
| CN4119 Final Year Design Project (over 2 consecutive semesters) [4] | 8 |
| **Sub-total for Common Curriculum** | **60** |
| **Engineering Core** | |
| 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<br>CFG2101 NUS Vacation Internship Programme [5] and EG3612 Vacation Industrial Attachment | 10 |
| **Sub-total for Engineering Core** | **20** |
| **Engineering Programme Requirements** | |
| 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 |
| **Sub-total for Engineering Programme Requirements** | **40** |
| **Unrestricted Electives** | |
| Group A course for Minor | 4 |
| Group B course for Minor | 4 |
| CDE3301 Ideas to Proof-of-Concept (over 2 consecutive semesters) | 12 |
| Other unrestricted electives [4] | 20 |
| **Sub-total for Unrestricted Electives** | **40** |
| **Total** | **160** |

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Notes:

[1] Students may read equivalent courses in NUS College (NUSC), University Town College Programme (UTCP), and Ridge View Residential Programme (RVRC).

[2] Students who are not in NUSC, UTCP or RVRC but have read another GESS Singapore Studies course prior to CDE2501 must still complete CDE2501.

[3] Students who have already read CDE2000 Creating Narratives and/or IE2141 Systems Thinking and Dynamics must still complete the 12 units of additional technical courses from their Engineering major.

The latest list of additional technical course may be found on this website: https://cde.nus.edu.sg/undergraduate/curriculum-structure/

Poly-intake students and those in the Engineering Scholars Programme only need to complete 8 units of additional technical course. The remaining 4 units may be fulfilled by CDE2501 (if not in NUSC/UTCP/RVRC and using another course to fulfil Singapore Studies), CDE2000, IE2141, or a third additional technical course.

[4] Students may take CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up in lieu of CN4119 and 4 units of unrestricted electives.

[5] May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).

*(updated 15 July 2025)*

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## Recommended semester schedule – JC-intake students or equivalent

(for students who opt for vacation internships)

| Semester 1 | Units | Semester 2 | Units |
|---|---|---|---|
| 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 and 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 |
| **Sub-total** | **20** | **Sub-total** | **20** |

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

| Semester 3 | Units | Semester 4 | Units |
|---|---|---|---|
| CN2103 Mass & Energy Balance | 4 | CN2105 Reaction Engineering | 4 |
| CN2104 Chemical Engineering Thermodynamics | 4 | CN2106 Fluid Mechanics & Heat Transfer | 4 |
| CDE2501 Liveable Cities | 4 | ES2631 Critique and Communication of Thinking and Design | 4 |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4 | Additional technical course 1 | 4 |
| Group A/B course for Minor | 4 | CDE3301 Ideas to Proof-of-Concept | 6 |
| **Sub-total** | **20** | **Sub-total** | **22** |

| Summer vacation between Semesters 4 and 5 | Units |
|---|---|
| EG3612 Vacation Internship Attachment | 6 |
| **Sub-total** | **6** |

| Semester 5 | Units | Semester 6 – can be used for SEP | Units |
|---|---|---|---|
| CDE3301 Ideas to Proof-of-Concept | 6 | Additional technical course 3 | 4 |
| CN3103 Mass Transfer and Separation Processes | 4 | GEC/GEN | 4 |
| CN3104 Computer-Aided Chemical Process Simulation | 4 | GEC/GEN | 4 |
| EG2401A Engineering Professionalism | 2 | UE | 4 |
| Additional technical course 2 | 4 | UE | 4 |
| **Sub-total** | **20** | **Sub-total** | **20** |

| Semester 7 | Units | Semester 8 | Units |
|---|---|---|---|
| CN4119 Final Year Design Project | 4 | CN4119 Final Year Design Project | 4 |
| CN4101 Process Control and Safety | 4 | CN4102 Chemical Engineering Lab | 4 |
| UE | 4 | UE | 4 |
| UE | 4 | | |
| **Sub-total** | **16** | **Sub-total** | **12** |

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## Recommended semester schedule – JC-intake students or equivalent

(for students who opt for industrial attachment)

| Semester 1 | Units | Semester 2 | Units |
|---|---|---|---|
| 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 and 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 |
| **Sub-total** | **20** | **Sub-total** | **20** |

| 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 | ES2631 Critique and Communication of Thinking and Design | 4 |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4 | Additional technical course 1 | 4 |
| Group A/B course for Minor | 4 | CDE3301 Ideas to Proof-of-Concept | 6 |
| **Sub-total** | **20** | **Sub-total** | **22** |

| Semester 5 | Units | Semester 6 | Units |
|---|---|---|---|
| CDE3301 Ideas to Proof-of-Concept | 6 | EG3611A Industrial Attachment | 10 |
| CN3103 Mass Transfer and Separation Processes | 4 | | |
| CN3104 Computer-Aided Chemical Process Simulation | 4 | | |
| EG2401A Engineering Professionalism | 2 | | |
| Additional technical course 2 | 4 | | |
| GEC/GEN | 4 | | |
| **Sub-total** | **24** | **Sub-total** | **10** |

| Semester 7 | Units | Semester 8 | Units |
|---|---|---|---|
| CN4119 Final Year Design Project | 4 | CN4119 Final Year Design Project | 4 |
| CN4101 Process Control and Safety | 4 | CN4102 Chemical Engineering Lab | 4 |
| Additional technical course 3 | 4 | UE | 4 |
| GEC/GEN | 4 | UE | 4 |
| UE | 4 | UE | 4 |
| UE | 4 | | |
| **Sub-total** | **24** | **Sub-total** | **20** |

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## Recommended semester schedule – JC-intake students or equivalent

(for students in Engineering Scholars Programme)

| Semester 1 | Units | Semester 2 | Units |
|---|---|---|---|
| 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 Ideas to Proof-of-Concept | 6 |
| UTCP course 1 (replaces GE) | 4 | Group A/B course for Minor | 4 |
| **Sub-total** | **24** | **Sub-total** | **28** |

| Semester 3 | Units | Semester 4 – NOC | Units |
|---|---|---|---|
| CN2105 Reaction Engineering | 4 | NOC | |
| CN2106 Fluid Mechanics & Heat Transfer | 4 | | |
| CN3103 Mass Transfer and Separation Processes | 4 | | |
| Additional technical course 1 | 4 | | |
| UTCP course 3 (replaces CDE2501) | 4 | | |
| CDE3301 Ideas to Proof-of-Concept | 6 | | |
| **Sub-total** | **26** | **Sub-total** | **20** |

| Semester 5 | Units | Semester 6 | Units |
|---|---|---|---|
| CN4119 Final Year Design Project | 4 | 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 |
| Additional technical course 2 | 4 | Additional technical course 3 | 4 |
| CN3104 Computer-Aided Chemical Process Simulation | 4 | UE | 4 |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4 | UE | 4 |
| UE | 2 | | |
| **Sub-total** | **26** | **Sub-total** | **24** |

Students must complete the following courses before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 units)
- EG1311 Design and Make (4 units)
- MA1505 Mathematics I (4 units) – replaces MA1511 Engineering Calculus (2 units) and counted as UE (2 units)

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A one-semester NOC programme comprises the following courses (up to 20 units):

- ETP3201S Innovation & Enterprise Internship (12 units) – replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (4 units) – counted as UE (4 units)
- Entrepreneurship course (4 units) – counted as UE (4 units)

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## Recommended semester schedule – poly-intake students

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

| Semester 1 | Units | Semester 2 | Units |
|---|---|---|---|
| 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 Ideas to Proof-of-Concept | 6 |
| | | Group A/B course for Minor | 4 |
| **Sub-total** | **20** | **Sub-total** | **22** |

| 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 | ES2631 Critique and Communication of Thinking and Design | 4 |
| CE2407A Uncertainty Analysis for Engineers * | 2 | Additional technical course 2 | 4 |
| CDE2501 Liveable Cities | 4 | GEC/GEN | 4 |
| Additional technical course 1 | 4 | GEC/GEN | 4 |
| CDE3301 Ideas to Proof-of-Concept | 6 | | |
| **Sub-total** | **26** | **Sub-total** | **24** |

| Semester 5 | Units | Semester 6 | Units |
|---|---|---|---|
| CN4119 Final Year Design Project | 4 | 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 | Additional technical course 3 | 4 |
| CN4101 Process Control and Safety | 4 | EG2401A Engineering Professionalism | 2 |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4 | | |
| **Sub-total** | **20** | **Sub-total** | **14** |

* 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 and Make (4 units)
- EG3611A Industrial Attachment (10 units)
- Unrestricted electives (20 units)

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

*(updated 15 July 2025)*

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(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 |
| GEC/GEN | 4 | GEC/GEN | 4 |
| | | Group A/B course for Minor | 4 |
| **Sub-total** | **20** | **Sub-total** | **20** |

| 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 | ES2631 Critique and Communication of Thinking and Design | 4 |
| CE2407A Uncertainty Analysis for Engineers * | 2 | Additional technical course 2 | 4 |
| CDE2501 Liveable Cities | 4 | CDE3301 Ideas to Proof-of-Concept | 6 |
| Additional technical course 1 | 4 | | |
| Group A/B course for Minor | 4 | | |
| **Sub-total** | **24** | **Sub-total** | **22** |

| Semester 5 | Units | Semester 6 | Units |
|---|---|---|---|
| CN4119 Final Year Design Project | 4 | 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 | Additional technical course 3 | 4 |
| CN4101 Process Control and Safety | 4 | EG2401A Engineering Professionalism | 2 |
| EE2211 Introduction to Machine Learning or EE2213 Introduction to Artificial Intelligence | 4 | | |
| CDE3301 Ideas to Proof-of-Concept | 6 | | |
| **Sub-total** | **26** | **Sub-total** | **14** |

* 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 and Make (4 units)
- EG3611A Industrial Attachment (10 units)
- Unrestricted electives (20 units)

*(updated 15 July 2025)*