

# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** ORGANIC SYNTHESIS FOR DRUG DESIGN

**Unit ID:** SCCHM3004

**Credit Points:** 15.00

**Prerequisite(s):** (SCCHM1002 and SCCHM2001)

**Co-requisite(s):** Nil

**Exclusion(s):** Nil

**ASCED:** 010501

## Description of the Unit:

In this unit students will study the structure, synthesis, reactivity and analysis of simple organic molecules with a focus on pharmaceuticals and biochemicals. Specific topics will include reactive intermediates, molecular rearrangements, elimination reactions, nucleophilic substitution, aromatic and heterocyclic chemistry, carbonyl compounds and organometallic compounds. Students will apply these synthetic processes to drug design problems, both in theory and in the laboratory.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

## Work Experience:

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

## Course Level:

| Level of Unit in Course | AQF Level of Course |   |   |   |   |    |
|-------------------------|---------------------|---|---|---|---|----|
|                         | 5                   | 6 | 7 | 8 | 9 | 10 |
| Introductory            | ■                   | ■ | ■ | ■ | ■ | ■  |
| Intermediate            | ■                   | ■ | ■ | ■ | ■ | ■  |

| Level of Unit in Course | AQF Level of Course |   |   |   |   |    |
|-------------------------|---------------------|---|---|---|---|----|
|                         | 5                   | 6 | 7 | 8 | 9 | 10 |
| Advanced                | ■                   | ■ | ✓ | ■ | ■ | ■  |

### Learning Outcomes:

#### Knowledge:

- K1.** Apply the key concepts of chemical structure and bonding to an understanding of reactivity of organic molecules and intermediates.
- K2.** Discuss the reactivity of organic functional groups and write equations for their common reactions.
- K3.** Describe the mechanisms of key organic reactions and predict the conditions which favour these reactions.

#### Skills:

- S1.** Predict the products of a range of organic reactions.
- S2.** Demonstrate problem solving skills and ability to work both independently and in small groups.
- S3.** Design and undertake organic synthesis in the laboratory and use modern instrumental techniques to identify and characterize products.

#### Application of knowledge and skills:

- A1.** Suggest reaction pathways and favourable conditions for the synthesis of simple organic molecules from readily available materials and design and undertake these syntheses in the laboratory.

#### Unit Content:

In this unit, students will study the structure, synthesis, reactivity and analysis of simple organic molecules with a focus on pharmaceuticals and bio-chemicals.

Topics may include:

- Reactive intermediates and molecular rearrangements
- Elimination reactions from alkenes
- Nucleophilic substitution and elimination
- Aromatic and heterocyclic chemistry
- Carbonyl compounds and their derivatives
- Organometallics
- Retrosynthesis

#### FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

| FEDTASK attribute and descriptor              |   | Development and acquisition of FEDTASKS in the Unit |                       |
|---|---|---|-----------------------|
|   |   | Learning Outcomes (KSA)                             | Assessment task (AT#) |
| FEDTASK 1<br>Interpersonal                    | <p>Students will demonstrate the ability to effectively communicate, inter-act and work with others both individually and in groups. Students will be required to display skills in-person and/or online in:</p> <ul style="list-style-type: none"> <li>Using effective verbal and non-verbal communication</li> <li>Listening for meaning and influencing via active listening</li> <li>Showing empathy for others</li> <li>Negotiating and demonstrating conflict resolution skills</li> <li>Working respectfully in cross-cultural and diverse teams.</li> </ul> | S2-S3, A1   | AT1                   |
| FEDTASK 2<br>Leadership                       | <p>Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>Creating a collegial environment</li> <li>Showing self-awareness and the ability to self-reflect</li> <li>Inspiring and convincing others</li> <li>Making informed decisions</li> <li>Displaying initiative</li> </ul>   | S2-S3, A1   | AT1                   |
| FEDTASK 3<br>Critical Thinking and Creativity | <p>Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>Reflecting critically</li> <li>Evaluating ideas, concepts and information</li> <li>Considering alternative perspectives to refine ideas</li> <li>Challenging conventional thinking to clarify concepts</li> <li>Forming creative solutions in problem solving.</li> </ul>   | S2-S3, A1   | AT1                   |

| FEDTASK attribute and descriptor             |  | Development and acquisition of FEDTASKS in the Unit |                       |
|--|--|---|-----------------------|
|  |  | Learning Outcomes (KSA)                             | Assessment task (AT#) |
| FEDTASK 4<br>Digital Literacy                | <p>Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>Finding, evaluating, managing, curating, organising and sharing digital information</li> <li>Collating, managing, accessing and using digital data securely</li> <li>Receiving and responding to messages in a range of digital media</li> <li>Contributing actively to digital teams and working groups</li> <li>Participating in and benefiting from digital learning opportunities.</li> </ul>  | K1-K3, S1-S3  | AT1                   |
| FEDTASK 5<br>Sustainable and Ethical Mindset | <p>Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts</li> <li>Committing to social responsibility as a professional and a citizen</li> <li>Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses</li> <li>Embracing lifelong, life-wide and life-deep learning to be open to diverse others</li> <li>Implementing required actions to foster sustainability in their professional and personal life.</li> </ul> | A1  | AT1                   |

**Learning Task and Assessment:**

| Learning Outcomes Assessed | Assessment Tasks   | Assessment Type                            | Weighting |
|----------------------------|--|--|-----------|
| S1, S2, S3, A1             | Design and carry out organic synthesis in the laboratory                                       | Laboratory performance and written reports | 30-50%    |
| K1, K2, K3, S1, S2, A1     | Short answer questions, synthesis problems, application of key chemical concepts to reactivity | Formative Tests and Summative Tests/Exams  | 50-70%    |

**Adopted Reference Style:**

Other (APA, IEEE or Royal Society of Chemistry (RSC) style)

 Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)