

# CHEM 3004 ADVANCED ORGANIC CHEMISTRY

**Credit Points** 10

**Legacy Code** 300906

**Coordinator** Kamali Kannangara ([https://directory.westernsydney.edu.au/search/name/Kamali Kannangara/](https://directory.westernsydney.edu.au/search/name/Kamali%20Kannangara/))

**Description** This unit builds on the reactions learnt in the unit Organic Chemistry, extending the range of C-C bond forming reactions to include the most significant in modern synthesis. In the second stage students learn to develop multistep synthetic strategies to produce target molecules using their level 2 organic chemistry and the reactions above. Structural analysis by mass spectroscopy and more advanced NMR techniques is also investigated. The students use this chemistry in a lab course designed to highlight a number of these concepts (including the synthesis of 2 pharmaceutical compounds and a team experiment) and to extend their range of practical skills.

**School** Science

**Discipline** Organic Chemistry

**Student Contribution Band** HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 3 subject

**Pre-requisite(s)** CHEM 2008

**Equivalent Subjects** LGYA 6141 - Drug Design and Synthesis CHEM 3013 - Organic Chemistry 3

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Apply relevant knowledge to major carbon-carbon bond forming reactions in organic chemistry
2. Analyse information on a range of chemical reactions and the reagents, solvent and conditions to predict the structure of reaction major product and by-products
3. Analyse and apply scientific knowledge to solve problems on the mechanism, regio- and stereo-specific organic reactions with experimental outcomes across the discipline
4. Explain reactions of simple heterocyclic systems
5. Analyse and interpret qualitatively and quantitatively the spectroscopic data (Infrared, UV and  $^1\text{H}$ ,  $^{13}\text{C}$  Nuclear Magnetic Resonance (NMR) spectroscopy and mass spectral data) to elucidate the organic molecular structures
6. Successfully plan and conduct basic chemical investigations on synthetic techniques for organic compounds carrying out the risk assessments and conforming to safe laboratory practices, either individually or a member of a team
7. Generate a formal Lab report and/or record of the experimental data, by interpreting data with an awareness of the conventions of scientific writing with chemical mechanisms, critiquing the methodology, accuracy and reliability of data and proposing strategies to improve

## Subject Content

1. Nucleophilic C-C bond forming reactions

2. C-C bond formation via palladium coupling and ring closing metathesis
3. C-C bond formation via orbital symmetry controlled reactions
4. Introductory heterocyclic chemistry
5. Spectroscopy (IR, UV, Mass &  $^1\text{H}$  and  $^{13}\text{C}$  NMR)
6. Synthetic design
7. Total organic synthesis

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Item  | Length  | Percent | Threshold | Individual/Group Task |
|---|---|---------|-----------|-----------------------|
| Practical Component   | 300 words in total for the lab report (10%); Lab report on multi-step synthesis up to 1,000 words including chemical structures (15%); A 3-minute oral presentation of a single PPT slide relevant to organic synthesis (5%). | 30      | Y         | Individual            |
| Assignment No 1 - The total Organic Synthesis Reactions and Mechanisms      | Up to 100 words and chemical structures   | 5       | N         | Individual            |
| Assignment No 2 - Organic Molecule Structure Elucidation Using Spectroscopy | 1 hour, an individual assignment under supervision during week 11, to be scheduled during the lecture time  | 10      | N         | Individual            |
| Mid-Semester Exam   | 1 hour  | 15      | Y         | Individual            |
| Final Exam  | 2 hours   | 40      | Y         | Individual            |

Prescribed Texts

- Organic Synthesis by Michael B. Smith ? (3rd Edn, 2011 Elsevier) Electronic ISBN 978-0-12-415884-9

Teaching Periods

## Spring

### Parramatta - Victoria Rd

#### Day

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View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=CHEM3004\\_22-SPR\\_PS\\_D#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CHEM3004_22-SPR_PS_D#subjects))