

# **MASTER OF GREEN CHEMISTRY AND SUSTAINABLE TECHNOLOGIES**

[monash.edu/science/mgcst](https://monash.edu/science/mgcst)





The future of industry is changing.

Advances in chemistry and engineering have shaped our world from pharmaceuticals, and food production, to the clothes we wear, the homes we live in, the cars we drive, our cosmetics, cleaning products, and so much more.

But it's unsustainable.

Today's new world demands a new approach – one that reduces or eliminates hazardous wastes from production processes.

That's why Monash University is introducing the new Master of Green Chemistry and Sustainable Technologies – the first course of its kind in the Southern Hemisphere focusing on green and sustainable chemistry.

“Green chemistry is a paradigm shift. It is the ability not to just learn to effectively deal with and regulate the use of hazardous materials but to think outside the box and create products without using hazardous materials.”

Distinguished Professor John C Warner,  
Monash University School of Chemistry.

# COURSE INTRODUCTION

The Master of Green Chemistry and Sustainable Technologies recognises the increasing demand for graduates with expertise in green chemistry to lead the transformation of chemical and other industries where the chemistry and chemical engineering play a crucial role, in delivering the products coming from those industries.

As a student in this program, you will have the opportunity to design and implement new products and processes that will highlight the role that chemistry has to play in addressing the UN Sustainable Development Goals.

The program will provide you with the principles of green technologies and a deep understanding of sustainability issues that will lead to the reduction or elimination of hazardous substances involved in the design, manufacture and application of chemical products. The course will also examine the environmental, economic and social benefits arising from the transformation of the chemical industries of the future.



## AT A GLANCE:

### CAMPUS

Clayton campus

### DURATION

**2 years full time** (if you have bachelor degree with at least first year Chemistry subjects or equivalent)

**1.5 years full time** (if you have previously completed a major in Chemistry.)

**1 year full time** (if you have previously completed a major in Chemistry and a significant research project in a related area.)

### COURSE INTAKES

Semester 1 (March), Semester 2 (July).

## CAREER OUTCOMES

As a graduate of this course you will find many career opportunities open to you in a range of areas including:

- Process development and pharmaceutical companies
- Food, cosmetics and cleaning companies
- Agrochemical and polymer industries
- Manufacturing, environmental and sustainable services or companies
- Private and public biotech companies
- CSIRO and chemical research institutes
- Government and consultancy
- Education.

## COURSE STRUCTURE

The course is structured in four parts. Each part is 24 points. All students complete Parts A and C. Depending upon your prior qualifications, you may receive credit for specific units in all parts of the course for relevant qualifications at undergraduate or graduate levels, respectively.

### Part A. Green Chemistry and Sustainable Technologies

In these studies, you will be introduced to key concepts in Green Chemistry and Sustainable Technologies including the design and thinking processes that lead to the production and management of future chemicals in a variety of industries. You will participate in a consultancy projects to gain an authentic perspective in the discipline.

### Part B. Further Studies in Chemistry

These studies will develop the discipline knowledge and skills in Chemistry required to study Parts A and C.

### Part C. Specialist studies in Green Chemistry and Sustainable Technologies

You will develop expertise through studio-lab studies in the design and chemical applications of Chemistry. These studies are complemented by a range of units selected to either deepen your knowledge of green chemistry, manage sustainability or engage with key concepts related to the environment.

### Part D. Advanced practice in Green Chemistry and Sustainable Technologies

You will select a coursework pathway or thesis.

The coursework pathway option includes the opportunity to undertake an internship in industry or a desktop project; these options are studied alongside a choice of listed electives.

The second option is to undertake a 24 point research project requiring a thesis output. If you wish to use this Masters course as a pathway to a higher degree by research, you should consider taking this second option.

## COURSE MAP

YEAR 1	STUDY AREA	SUBJECT
PART A	<b>Green Chemistry and Sustainable Technologies</b> Core component of the program	<b>24 credit points</b> <ul style="list-style-type: none"> <li>GCH5010 Green Chemistry Fundamental Principles (6)</li> <li>GCH5020 Green Chemistry-Transforming Industry and Manufacturing (6)</li> <li>GCH5030 Green Chemistry Consultancy Project (12)</li> </ul>
PART B	<b>Further Studies in Chemistry</b> For people with a limited chemistry background	<b>24 credit points</b> Students select four subjects from 2nd and 3rd level chemistry including: <ul style="list-style-type: none"> <li>CHM2911 Inorganic and Organic Chemistry</li> <li>CHM2922 Spectroscopy and Analytical Chemistry</li> <li>CHM3972 Sustainable Chemistry</li> <li>CHM3911 Advanced Physical Chemistry</li> <li>CHM3922 Advanced Organic Chemistry</li> <li>CHM3941 Advanced Inorganic Chemistry</li> <li>CHM3952 Advanced Analytical Chemistry</li> <li>CHM3930 Medicinal Chemistry</li> <li>CHM3960 Environmental Chemistry</li> <li>CHM3180 Materials Chemistry</li> </ul> Students will receive course advice on the units they should take based on their academic background or work experience.

YEAR 2	STUDY AREA	SUBJECT
PART C	<b>Specialist Studies in Green Chemistry and Sustainable Technologies</b>	<b>24 credit points</b> <ul style="list-style-type: none"> <li>GCH5110 Designing Safer Chemicals (6)</li> <li>GCH5120 Green Chemical Synthesis and Applications (6)</li> <li>Two subjects (12 points) from a range of Masters level options</li> </ul>
PART D	<b>Advanced Practice in Green Chemistry and Sustainable Technologies</b> Core component of the program, but credit may be given for relevant research project	<b>24 credit points</b> <b>Research pathway</b> Students undertake a 24-point scholarly research thesis over one or two semesters. OR <b>Coursework pathway</b> Students complete the GCH5930 Sustainability Internship (12) OR the GCH5920 Sustainability Project (12) Plus 12 points of electives from the Part C not previously completed.

**Note** – While a progression is implied in the course map below, only Part B needs to be undertaken in Year 1 for students needing more background in chemistry. It is preferable for Part A to be undertaken before Parts C and D, but not mandatory and flexibility is a feature to accommodate the student's needs.

## ENGLISH LANGUAGE

Monash minimum: Level A, that is: IELTS (Academic): 6.5 overall (no band lower than 6.0); or Pearson Test of English (Academic): score of 58 overall with no band lower than 50; or TOEFL Internet-based test: score of 79 overall with minimum scores: Writing: 21, Listening: 12, Reading: 13 and Speaking: 18; or Equivalent approved English test.

## WHO YOU'LL BE WORKING WITH:

- Professor Phil Andrews
- Dr Victoria Blair
- Professor Edward Buckingham
- Associate Professor Michael Grace
- Professor Tanja Junkers
- Dr Sara Kyne
- Professor Antonio Patti
- Professor Andrea Robinson
- Dr Alexandr Simonov
- Professor John Warner.

## ENTRY REQUIREMENTS

### MINIMUM ENTRY REQUIREMENTS

#### ENTRY LEVEL 1:

**96 points to complete –**

**Duration: 2 years full-time, 4 years part- time**

An Australian bachelor degree (or equivalent) with at least first-year Chemistry Studies\* and at least 60% (credit) average overall, or equivalent qualification and experience approved by the faculty leading the specialisation.

\*knowledge of topics in Composition and Nomenclature of Matter; Physical, Chemical, Electrochemical Properties of Matter; Drivers of Molecular Interactions and Stability; Quantifying Chemical Reactions; Principles of Chemical Analysis.

#### ENTRY LEVEL 2:

**72 points to complete –**

**Duration: 1.5 years full-time, 3 years part-time**

An Australian bachelor degree (or equivalent) in a cognate discipline including Chemistry, Chemical Engineering, Biomedical Science, Materials Science, Biochemistry, or Biotechnology (with at least 12 points or equivalent of second level Chemistry) with at least 60% (credit) average, or equivalent qualification and experience approved by the faculty leading the specialisation.

#### ENTRY LEVEL 3:

**48 points to complete –**

**Duration: 1 year full-time, 2 years part- time**

An Australian bachelor honours degree (or equivalent) in the cognate discipline of Chemistry or Biochemistry with at least 60% (credit) average, or equivalent qualification and experience approved by the faculty leading the specialisation.



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## **FURTHER INFORMATION**

### **MONASH UNIVERSITY**

[monash.edu](https://monash.edu)

### **FIND A COURSE**

[monash.edu/study](https://monash.edu/study)

### **INTERNATIONAL STUDENTS**

[monash.edu/study/international](https://monash.edu/study/international)

### **OFF-CAMPUS LEARNING**

[monash.edu/study/international](https://monash.edu/study/international)

### **MONASH ON YOUTUBE**

[youtube.com/monashunivideo](https://youtube.com/monashunivideo)

### **FUTURE STUDENT ENQUIRIES**

**Australian citizens, permanent residents  
and New Zealand citizens**

[monash.edu/study/contact](https://monash.edu/study/contact)

### **International students**

T Australia freecall: 1800 MONASH (666 274)

T +61 3 9903 4788 (outside Australia)

E [study@monash.edu](mailto:study@monash.edu)

Wechat: MonashUniAus

Youku: Monash 蒙纳士大学

## **MONASH SCIENCE ONLINE**

### **WEBSITE**

[monash.edu/science](https://monash.edu/science)

### **FACEBOOK**

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