The Bachelor of Philosophy/Master of Research (BPhil/MRes) combines advanced disciplinary coursework and structured research training, to provide graduates with greater recognition for their academic progress, enhanced employment opportunities and pathways to further study overseas. The two-year full-time BPhil/MRes is the main pathway to a PhD at Macquarie University.

DEPARTMENT OF MOLECULAR SCIENCES

The Department of Molecular Sciences brings together academic staff with expertise in chemistry, biochemistry, biotechnology and cell biology to address the common molecular theme of their teaching and research. The unique combination of expertise within the Department, which spans “from molecules to cells”, provides the opportunity for our teaching and research to integrate chemical and biomolecular sciences to achieve a sustainable environment, understand health and disease, and advance new molecular technologies.

Research strengths of the Department include analytical chemistry, biochemistry, biotechnology, cellular biology, medicinal chemistry, microbiology, molecular biology and genomics, synthetic biology, organic/inorganic synthesis, proteomics, protein chemistry, physical chemistry. The Department currently hosts an ARC Training Centre for Molecular Technology in the Food Industry (ITTC Food); a node of the ARC Centre of Excellence in Nanoscale Biophotonics (CNBP) and the nationally funded Australian Proteome Analysis Facility (APAF).

We aim to produce excellent research that is supported by cutting edge technology and instrumentation, and has broad scientific and societal impact. We will also pursue strategies to increasingly engage with external stakeholders and deliver high quality research training that prepares our students for a range of employments now and in the future.

PROGRAM STRUCTURE

The MRes program consists of 32 credit points in Year 1 and research experiences (equivalent to 32 credit points) in Year 2. Students have access to a range of units from a variety of subject areas across the University. This allows the construction of a program relevant to your specific interests and skills, subject to academic approval.

Domestic students may study part-time but most international students must study full time.

YEAR 1

Program Structure: Year 1 Units (8 units required)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>FOSE7000</td>
<td>Research Communications Unit</td>
</tr>
<tr>
<td>MOLS7900</td>
<td>Research Frontiers Unit</td>
</tr>
<tr>
<td>MOLS7910</td>
<td>The Research Experience</td>
</tr>
</tbody>
</table>

Advanced Disciplinary Units (choose FIVE units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>MOLS7001</td>
<td>Selected Topics in Molecular Sciences 1</td>
</tr>
<tr>
<td>MOLS7002</td>
<td>Selected Topics in Molecular Sciences 2</td>
</tr>
<tr>
<td>MOLS7911</td>
<td>Laboratory Skills for Molecular Science Research</td>
</tr>
<tr>
<td>MOLS7053</td>
<td>Advanced Organic Chemistry</td>
</tr>
<tr>
<td>MOLS7052</td>
<td>Chemical Biology</td>
</tr>
<tr>
<td>MOLS7011</td>
<td>Advanced Biomolecular Analysis</td>
</tr>
<tr>
<td>MOLS7012</td>
<td>Synthetic Biology</td>
</tr>
<tr>
<td>MOLS7051</td>
<td>Advanced Physical and Analytical Chemistry</td>
</tr>
<tr>
<td>MOLS7611</td>
<td>Molecular and Medical Biotechnology</td>
</tr>
<tr>
<td>MOLS7211</td>
<td>Protein Discovery &amp; Analysis</td>
</tr>
<tr>
<td>MOLS7212</td>
<td>Functional Proteomics</td>
</tr>
<tr>
<td>MOLS7252</td>
<td>Analytical Measurement Uncertainty and Method Validation</td>
</tr>
<tr>
<td>MOLS7253</td>
<td>Laboratory Quality Systems</td>
</tr>
</tbody>
</table>

OTHER

Students have the flexibility to undertake units across all disciplines in the University, subject academic approval
YEAR 1 EXAMPLE UNIT CONTENTS

MOLS7900: Engages students with those topics currently dominating the chemical and biomolecular sciences. Activities are based on seminar attendance, as well as directed reading of research papers and the discussion and critiquing of research topics in written and seminar forms.

MOLS7211: This unit outlines molecular principles underlying today’s developments in protein science and biomedical research. As well as detailing modern separation technologies, the course addresses structural biology, protein analysis and bioinformatics.

MOLS7212: The unit is the study of protein expression in living systems, considered in a functional context. This allows us to better understand how protein networks become dysfunctional, which in turn enables the manipulation of protein functions and cellular phenotypes through the use of drug treatment, or genetic or environmental intervention.

MOLS7910: This unit provides hands-on experience by direct interface with molecular science underway in the Dept MOLS. Students participate in the programs of two distinct research groups and navigate typical situations encountered as members of a scientific research team.

MOLS7911: This unit provides hands-on experience of several of the sophisticated technologies currently utilised in molecular science. Students will select a portfolio of techniques according to their discipline background and interest.

MOLS7053: This unit provides the students with advanced and contemporary knowledge in the broad discipline of organic chemistry and focuses on topics that describe modern theories and practices in this area.

MOLS7052: This unit focuses on current topics in Chemical Biology, particularly experiments in which small molecules are used to probe or control biological systems in novel ways or manipulate biological systems.

MOLS7011: This unit provides a background to the data acquisition methods, quality control of the datasets, and analysis methods utilised in the biomolecular sciences. It will provide hands-on experience in the analysis of real large-scale datasets and the correct use of the appropriate analysis tools available.

MOLS7012: This unit builds on fundamental concepts in molecular biology and bio-engineering to explore themes in the emerging field of synthetic biology.

YEAR 2

Program Structure: Year 2 (Jan-Oct) or (Jul-Apr)

Five Core Activities
1) Thesis (50 pages) based on a research project
2) Research Frontiers 2
3) Literature Review
4) Research Planning
5) Research Methods

Year 2 of the MRes will be made up of structured research preparation and training, where candidates will:

- Extend discipline knowledge of research innovations;
- Survey the current literature related to their particular research interest;
- Engage with the latest research methods in their fields;
- Receive training in project management and plan a major research project, and
- Complete a significant individual research project of own design, with support of a supervisory team.

YEAR 2 EXAMPLE PROJECTS

The philosophy of the Molecular Sciences is studying ‘molecules to cells’ to achieve a sustainable environment, understand health and disease, and advance new molecular technologies. Projects on offer for Y2 in the Dept Molecular Sciences span the chemical and biomolecular sciences, but are unified by the common theme of working at the interface of biology and chemistry. These research interests are founded on discipline areas including: analytical chemistry, medicinal chemistry, environmental chemistry, chemical biology, synthetic chemistries, microbial genomics, proteomics, glycomics, biochemistry and biotechnology.

The Molecular Sciences Research Booklet can help students identify research interests. It contains brief descriptions of the research interests of all research active staff in the Dept. It is available as a PDF at: https://www.goto.mq.edu.au/molsci-booklet-2019

ELIGIBILITY

An undergraduate or postgraduate degree from a recognised institution and a GPA of at least 4.38 overall (7 point scale), and at least 5.25 at 300-level.

Candidates who have a complete Bachelor Honours degree or relevant Masters by coursework may receive up to 32 credit points towards the program (dependent on the content of previous study), making it possible to start the program from Year 2.

APPLICATION

Application are submitted online: https://www.mq.edu.au/research/phd-and-research-degrees/how-to-apply

APPLICATION DEADLINE for 2020 PROGRAM

- Domestic: 28 April 2020 (candidature and scholarship)
- International: 31 March 2020 (candidature only)

STIPENDS AND SCHOLARSHIPS

Macquarie has a scholarship program that provides opportunities each year to domestic and international students undertaking studies here. https://www.mq.edu.au/research/phd-and-research-degrees/scholarships

FOR MORE INFORMATION, VISIT:
https://www.mq.edu.au/research/phd-and-research-degrees