

# CHEM90010 Advanced Chemical Applications 1

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| <b>Credit Points:</b>                    | 12.50  |
| <b>Level:</b>                            | 9 (Graduate/Postgraduate)  |
| <b>Dates &amp; Locations:</b>            | 2011, Parkville<br>This subject commences in the following study period/s:<br>July, Parkville - Taught on campus.  |
| <b>Time Commitment:</b>                  | Contact Hours: 30 hours comprising 4 x 1 hour lectures and 1 x 1 hour tutorials each week. Estimated total time commitment of 120 hours per semester. Total Time Commitment: Not available   |
| <b>Prerequisites:</b>                    | None   |
| <b>Corequisites:</b>                     | None   |
| <b>Recommended Background Knowledge:</b> | None   |
| <b>Non Allowed Subjects:</b>             | None   |
| <b>Core Participation Requirements:</b>  | For the purposes of considering requests for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements for this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: <a href="http://www.services.unimelb.edu.au/disability/">http://www.services.unimelb.edu.au/disability/</a>   |
| <b>Coordinator:</b>                      | Assoc Prof Craig Hutton  |
| <b>Contact:</b>                          | Telephone: 8344 2393<br>Email: <a href="mailto:chutton@unimelb.edu.au">chutton@unimelb.edu.au</a>  |
| <b>Subject Overview:</b>                 | <p>Students enrolling in this subject must choose two of the following five 12-lecture modules:</p> <p><b>Interfacial Chemistry and Sonochemistry</b><br/>This module will study the production of nanometer-size colloids of metals, polymers and semiconductor particles using ultrasound, and how surface-active solutes affect the yield of the particles produced. The use of sonochemistry to decompose organic pollutants such as PCBs will also be discussed.</p> <p><b>Advanced Physical Organic Chemistry</b><br/>This module will explore the interrelationships between structure and reactivity in organic molecules. Topics such as substituent effects, linear free energy relationships and the Hammett equation will be applied to the determination of organic reaction mechanisms.</p> <p><b>Biological and Medicinal Chemistry</b><br/>This module will explore modern drug design principles, as well as the molecular basis of therapeutic activity and methods of synthesis of various drugs. Case studies will be used to highlight the discovery and development of important drug classes.</p> <p><b>Advanced Materials and Materials Characterisation</b><br/>This module will explore advanced materials such as porous materials, nanomaterials, and materials for clean energy. Common materials characterisation techniques, such as electron microscopy, powder X-ray diffraction, thermal analysis and gas sorption, will be studied.</p> <p><b>Magnetism in Chemistry</b><br/>This module will explore magnetochemistry in the context of isolated spins, discrete spin clusters and extended systems. Areas covered will include magnetic susceptibility, the mechanisms of magnetic exchange interactions, long range ordering in extended solids, spin crossover complexes and single-molecule magnets.</p> |
| <b>Objectives:</b>                       | <p>The objectives of this subject are to provide students with an increased knowledge and understanding of advanced chemical principles, with emphasis on:</p> <ul style="list-style-type: none"> <li># magnetochemistry and spin systems;</li> <li># properties and performance of materials;</li> </ul>  |

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|  | <ul style="list-style-type: none"> <li># inter-relationships between structure and reactivity in organic molecules;</li> <li># sono-chemical principles; and</li> <li># the chemistry of biological systems.</li> </ul> <p>Such knowledge will facilitate insights into the structure and properties of matter and the nature of chemical and biochemical transformations.</p>  |
| <b>Assessment:</b>                                 | Each module will be assessed by either;• a 1.5 hour exam after completion of the module, or• a 1 hour exam after completion of the module (60%) and an assignment (3000 words, 40%) due at the end of semester, or• a 1.5 hour exam after completion of the module (80%) and a 15 minute oral presentation mid-semester (20%).  |
| <b>Prescribed Texts:</b>                           | None  |
| <b>Breadth Options:</b>                            | This subject is not available as a breadth subject.   |
| <b>Fees Information:</b>                           | Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>   |
| <b>Generic Skills:</b>                             | <p>At the completion of this subject, students will gain skills in:</p> <ul style="list-style-type: none"> <li># advanced problem-solving and critical thinking skills</li> <li># an ability to evaluate the professional literature</li> <li># an understanding of the changing knowledge base</li> <li># a capacity to apply concepts developed in one area to a different context</li> <li># the ability to use conceptual models to rationalize experimental observations.</li> </ul> |
| <b>Related Course(s):</b>                          | Bachelor of Science (Degree with Honours)<br>Master of Science (Chemistry)  |
| <b>Related Majors/Minors/<br/>Specialisations:</b> | Environmental Science<br>Environmental Science  |