



The Chemistry of Periodic Elements

Module Coordinator	Aidan McDonald, School of Chemistry
What will you learn from this Elective?	<p>A history of the development of the chemical sciences and an insight into the human and industrial applications of modern chemistry. The chemistry that influenced anthropogenic eras (stone, bronze, iron ages) and the industrial (chemical) revolution of the 20th century will be explored. You will discover the roles the elements and chemicals play in modern life (health, medicine, farming, technology). Students will also be exposed to chemistry in a literary context (Levi's Periodic Table).</p> <p>An accessible fundamental education in the chemical sciences for non-chemists. You will learn some fundamental concepts of chemistry and molecular science: the electron, the nucleus, the atom, and the molecule. Students will explore chemical reactions, synthesis, and catalysis. The history of the Periodic Table and its modern incarnation will be scrutinised.</p> <p>Practical hands-on training in chemistry. Chemistry is at its core an experimental (practical) science. You will experience three hands-on experimental driven 2 hour sessions and perform at-home experiments and learn how to compose a scientific report.</p>
Student Workload	<ul style="list-style-type: none">• 34 direct contact hours: 22 lecture hours; 8 experimental hours (3 x 2 hour experimental demonstrations, 2 hour at home experimental session); 4 tutorial hours.• Project/Group work (25 hours): Individual essay and group lecture presentation.• Written experimental reports (12 hours – 4 x 3 hours).• Advance reading of online material, online problem-solving exercises, assessment preparation (29 hours).
Assessment Components	1 essay, 1 group presentation, 4 experimental reports (scientific reports). All assessments will occur during the semester ensuring students obtain feedback in a timely fashion.
Indicative Reading List	<p>Books: Chemistry & Chemical Reactivity (Kotz, Treichel, Townsend, Treichel); Periodic Tales (Hugh Aldersey-Williams); The Chemistry Book (Derek Lowe); Mendeleev's Dream (Paul Strathern); Molecules at an Exhibition (John Emsley); The Cartoon Guide to Chemistry (Gonick and Griddle); The Periodic Table (Primo Levi)</p> <p>Most lecture material and study material will also be available from online sources and online open texts: http://www.compoundchem.com, http://www.rsc.org/periodic-table, https://www.phtable.com, https://www.scientificamerican.com/article/chemistry-the-elements-revealed-interactive-periodic-table/, http://www.webelements.com, https://open.umn.edu/opentextbooks/textbooks/introductory-chemistry.</p> <p>A full reading list or list of resources will be provided to enrolled students.</p>
Learning Outcomes	On successful completion of this module, students should be able to:

1. **Define** the fundamental principles of Chemistry: the electron, the nucleus, the atom, and the molecule. Explain the concepts of chemical reactivity, synthesis, and catalysis. Define the conservation of mass and energy, and the efficiency of a chemical process. The students will develop their critical thinking and analysis skills through applying these fundamental concepts to understanding the periodic table. TE principle: expose students to new domains of knowledge.
2. **Describe** the history of Chemistry from the alchemists to Chemistry that influenced anthropogenic eras (stone, bronze, iron ages) and the industrial (chemical) revolution of the 20th century. They will explore the history of humankind in terms of chemical breakthroughs. TE Principle: expose students to new domains of knowledge, methods of enquiry and epistemologies, and the wider implications/consequences of the topic.
3. **Create and explore** individually introductory material demonstrating appreciation of a chemistry topic. Produce a public communication and outreach group presentation on the role of Chemistry in our everyday lives. TE principles: engage students in learning opportunities in diverse/heterogeneous groups; examine current and/or past critical issues using techniques and approaches from multiple disciplines.
4. **Analyse and evaluate** the operation of selected experimental Chemistry and a Chemical process in an academic and/or industrial setting and identify fundamental chemical reactivity concepts leveraged in these operations. TE principle: foster reflection, inquisitiveness, skills of analysis and critical thinking.