

THE GRIMWADE CENTRE FOR CULTURAL MATERIALS CONSERVATION  
SCHOOL OF HISTORICAL & PHILOSOPHICAL STUDIES  
FACULTY OF ARTS  
THE UNIVERSITY OF MELBOURNE



Chemistry Bridging Course, **17-21 June 2024** (1-week intensive)  
Course fee: \$1,490.00 (GST inclusive)

## INFORMATION SHEET

The Chemistry Bridging Course has been designed for students entering the MA (Cultural Material Conservation) program who have limited knowledge of chemistry, or students who wish to increase or revise their chemistry knowledge.

The intensive course provides:

- A preparation package, allowing students to read concepts and start practicing problems, thus enabling more learning during the intensive course.
- Lectures, which introduce fundamental chemical concepts like atomic structure, bonding, analysis techniques, acid/base chemistry, spectroscopy, inorganic and organic chemistry.
- Tutorial sessions where students solve exercises/problems under the guidance of a tutor. The aim is for students to become comfortable with scientific notation, the naming of compounds, measurement, chemical calculations, and common chemical reactions.
- Practical laboratory work, exposing students to common laboratory techniques and instrumentation, illustrating theoretical concepts covered in lectures.

### *Dates*

The course is taught in a 1-week block, starting Monday June 17, and concluding Friday June 21, 2024. Classes will be held **Monday to Friday**, from 9 am to 5 pm.

### *Format*

The course consists of lectures, tutorials, and laboratory sessions. Lectures and some tutorials will be provided online. Wednesday will be devoted to tutorials. Monday, Tuesday, Thursday, and Friday will be devoted to laboratory work, which will include:

- Experiments which illustrate and apply theoretical concepts.
- Calculations involved with preparing solutions and analysing results.
- An introduction to instrumentation and spectroscopic methods.

### *Facilities and resources*

Lectures will be provided online. Tutorial and practical sessions will be held at the Centre for Cultural Materials Conservation at the University of Melbourne.

### *Texts*

There are many general chemistry texts that would be suitable references for this course.

- The following text is required for the MA course, and so would be a sensible purchase at this time: **Zumdahl, S., *Chemistry*, 4<sup>th</sup> / 5<sup>th</sup> / 6<sup>th</sup> / 7<sup>th</sup> / 8<sup>th</sup> / 9<sup>th</sup> / 10<sup>th</sup> edition.** A similar, but more basic text by the same author, is Zumdahl, S., *Introductory Chemistry. A Foundation* 5<sup>th</sup> edition.
- The UK Museums and Galleries Commission has published a basic but useful series titled: *Science for Conservators*, Volumes 1, 2, 3. Volume 1 – *An Introduction to Materials* is recommended.

### Course Outline

#### Day 1: General introduction.

- Atomic structure, periodic table of the elements, metals and non-metals, and types of bonding.
- Laboratory safety.
- Measurement and treatment of experimental data.
- Stoichiometric calculations, mole concept.

#### Day 2: Physical chemistry.

- Acid-base chemistry - pH scale, pH measurement, and buffers.
- Titration of acids and bases.
- Spectroscopy and the Beer-Lambert Law.
- Reaction kinetics and equilibrium.

#### Day 3: Tutorial intensive.

#### Day 4: Inorganic Chemistry.

- Electronegativity, bonding, and molecular forces.
- Metals, salts, and their structures.
- Solubility and precipitation.
- Transition metals.
- Redox chemistry: galvanic cell, half-cell potentials and electrolysis.

#### Day 5: Organic Chemistry.

- Hydrocarbons, molecular models, and isomers.
- Functional groups and their effect on solubility and acid/base properties.
- Polymers – types, methods of polymerization, properties.
- Separating mixtures and methods for structure determination.

### Enrolment deadline: **27<sup>th</sup> May 2024 & 31<sup>st</sup> May 2024**

**n.b. To ensure your place in the course it is in your interest to complete the 2-step enrolment process as early as possible.**

- Step 1: Submit enrolment application form (due **27 May 2024**).
- Step 2: Make enrolment payment when the e-cart becomes available (due **31 May 2024**).

Detailed course preparation materials (including online lectures) will be provided, which students will work through prior to the start of the course.

For further course information, visit: <https://arts.unimelb.edu.au/grimwade-centre-for-cultural-materials-conservation/teaching-and-learning/chemistry-bridging-course>

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