Course Title:	**Molecular Spectroscopy**
Course Code:	**CHEM808**
Descriptor Start Date:	**01/01/2026**
POINTS:	**15.00**
LEVEL:	**8**
PREREQUISITE/S:	
COREQUISITE/S:	
RESTRICTION/S:	

LEARNING HOURS

Hours may include lectures, tutorials, online forums, laboratories. Refer to your timetable and course information in Canvas for detailed information.

Total learning hours: 150

PRESCRIPTOR

Introduces the key spectroscopic methods used by chemists and biochemists to analyse the molecular and electronic structure of atoms and molecules.

LEARNING OUTCOMES

1. Discuss the key principles and postulates of quantum mechanics.
2. Use quantum mechanical principles to describe the electronic structure of atoms and molecules.
3. Investigate the theoretical foundations of light-matter interactions and how they relate to molecular spectroscopy.
4. Apply principles of symmetry and group theory to account for spectroscopic processes in molecular systems.
5. Analyse spectroscopic data by application of quantum mechanics and group theory

CONTENT

- Failures of classical physics
- Operators and postulates of quantum mechanics
- Schrödinger equation and one-body problems
- Rotations, angular momentum and the hydrogen atom
- Spin and the Pauli principle
- Orbital approximation and variational principle
- Atomic energy levels
- Valence molecular energy levels
- Symmetry and group theory
- The nature of electromagnetic radiation
- Time-dependent perturbation theory of spectroscopy
- Rotational, vibrational and electronic spectroscopy of molecules

LEARNING & TEACHING STRATEGIES

This course is offered as a combination of formal and informal lectures, class discussion, informal contact with the student throughout the duration of the course, and written submissions. Considerable independent study is expected.

ASSESSMENT PLAN

Assessment Event	Weighting %	Learning Outcomes
Test 1 (120 mins)	30.00	LO1, LO2, LO4
Test 2 (120 mins)	30.00	LO1, LO2, LO3, LO4, LO5
Portfolio	40.00	LO1, LO2, LO3, LO4, LO5

Grade Map **MAP1**

A+ A A- Pass with Distinction
B+ B B- Pass with Merit
C+ C C- Pass
D Fail

Overall requirement/s to pass the course:

Students must achieve an overall average grade of at least C- across all summative assessments to pass this course.

LEARNING RESOURCES

A suite of electronic learning resources and other information specifically relevant to the academic development needs of postgraduate students is available from the Library website.

For further information, contact: Te Ara Hauora A Putaiao - Faculty of Health & Environmental Science

Principal Programme:	**HA2037, Master of Science**
Related Programme/s:	**AK1037 Master of Science (Research)** **AK1038 Postgraduate Diploma in Science** **AK1039 Postgraduate Certificate in Science** **AK1040 Bachelor of Science (Honours)** **AK2037 Master of Science** **AK2040 Bachelor of Advanced Science (Honours)**