

Chemistry 4400B

Radiation, Nuclear, and Radiopharmaceutical Chemistry

Instructor: Prof. Samantha Gateman

Term: Winter 2026

Lecture Time: 3 hours/week

Credits: 0.5

Level: 2nd to 4th Year BSc Chemistry Students

Prerequisites: Chemistry 1301A and Chemistry 1302A/B. Permission of the Department is granted automatically to all students who have these prerequisites.

Course Description

This course introduces students to the chemical principles of nuclear transformations, radiation interactions, and the development and use of radiopharmaceuticals. Emphasis is placed on the role of nuclear chemistry in the energy sector, healthcare (diagnostics and therapy), and environmental applications. Students will gain experience in fundamental nuclear theory, practical radiochemical methods, and safety protocols.

Learning Outcomes

By the end of the course, students will be able to:

- Describe the principles of radioactive decay, nuclear reactions, and radiation-matter interactions.
- Explain how radioisotopes are produced and applied in medicine, energy, and research.
- Analyze radiation detection methods and dosimetry practices.
- Discuss radiolysis and radiation-induced chemical effects.
- Evaluate ethical and safety concerns associated with radiation use.
- Critically assess literature and current challenges in nuclear and radiopharmaceutical chemistry.