

## Liverpool John Moores University

Title: RADIATION AND MATTER  
Status: Definitive  
Code: **5001APCHEM** (121129)  
Version Start Date: 01-08-2021

Owning School/Faculty: Pharmacy & Biomolecular Sciences  
Teaching School/Faculty: Pharmacy & Biomolecular Sciences

Team	Leader
Barry Nicholls	Y
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**Academic Level:** FHEQ5  
**Credit Value:** 20  
**Total Delivered Hours:** 63  
**Total Learning Hours:** 200  
**Private Study:** 137

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	55
Tutorial	6

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	60	2
Report	Report	Open book report	25	
Test	Test	On-line test	15	

### Aims

*This module provides candidates with a comprehensive description of fundamental aspects of the properties and chemistry of transition metal complexes, together with a rationalization of how non-ionising radiation interacts with simple matter to produce a variety of spectra within different branches of the electromagnetic*

*spectrum. It also outlines how quantum mechanics differ from classical theories and thus its importance at the atomic level. The kinetics of enzymes reactions is offered in detail, and how QSAR analysis can predict changes to rates of reaction.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Predict the form of microwave, infrared and ultraviolet/visible spectra
- 2 Discuss the toxicology of metal ions in the environment
- 3 Rationalise the form and reactions of transition metal complexes, and to calculate their crystal field stabilisation energies and magnetic moments.
- 4 Discuss the quantum mechanical description of matter and appreciate the difference to classical mechanics
- 5 Discuss the use of QSARs in relation to enzyme kinetics

## Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	2	3	4	5
Report	1	2	3	4	5
On-line test	1	2	3	4	

## Outline Syllabus

*The following topics will be covered in this module:*

- *Principles of co-ordination chemistry*
- *Chemistry of the transition metals*
- *Toxicology of metal ions*
- *Interaction of radiation with matter*
- *Quantum Mechanics*
- *Enzyme kinetics*
- *QSAR*

## Learning Activities

Lectures and tutorials

## Notes

This module is designed for semester 1 delivery only. The syllabus is supported by both standard lectures and tutorials, together with teaching materials held on BlackBoard and books from the standard literature. The module is assessed by one

open-book comprehensive written assignment, together with one closed-book formal examination of 2 hours duration, held within 4 weeks of the module's conclusion. The pass mark is set at 40% for the whole module. There is no lower limit set for the individual components.

In this module you will learn about quantum chemistry and how we use its principles to describe matter and understand behaviour. You will apply this to analytical techniques which are used to characterise materials and learn about the different states that atoms can adopt.

Following on from the main group chemistry covered in level 4, you will study the chemistry and properties of the transition metals and apply that knowledge to learn why different metal ions show different toxicities.