

School of Chemistry

Aims and Objectives: Session 2023-2024, Semester 2

Module CH2601: Organic Chemistry 2

Course Title: Medicinal and Enzyme Chemistry

Duration: 12 hours

Lecturers: Dr C. P. Johnston and Professor T. K. Smith

Aims: The aim of this part of the module is to discuss the basic principles of enzymes and their catalyst in metabolic pathways, and the use of medicinal chemistry in drug design.

Objectives:

1. Understand what enzymes are and what influences enzyme activities.
2. Understand what enzymes do with regards to cellular metabolism.
3. Introduction to ligand-protein interactions, be able to recognise the key functional groups of the amino acid side chains in proteins and to learn about their acidity and basicity.
4. Be able to recognise key functional groups and learn about the concept of hydrogen bonding donors and acceptors, electrostatic interactions, van der Waals interactions, hydrophobic interactions used in substrates/inhibitor binding.
5. Explain the differences between chemical and enzyme kinetics and highlight the physical basis of enzyme kinetics and assumptions made.
6. Understand the meaning of, and how to determine K_M , V_{max} , k_{cat} and other kinetic parameters.
7. How to assay an enzyme to obtain kinetics information; continuous versus non-continuous assays, direct and coupled assays.
8. Understand the different types of inhibition, and know how kinetics helps to distinguish between them.
9. Introduction of further concepts including structure activity relationships (SAR), quantitative structure activity relationships (QSAR), the pharmacophore.
10. Understand how medicinal chemistry is used to overcome solubility issues/ metabolism/stability issues/ protein binding problems of your lead compound.

11. Discuss some case studies of successful drug development programs illustrating the drug development process and the strategies that are employed.