

Liverpool John Moores University

Title: Chemistry of Life
Status: Definitive
Code: **5005CHACAP** (117491)
Version Start Date: 01-08-2013

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

Team	Leader
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Academic Level: FHEQ5 **Credit Value:** 24.00 **Total Delivered Hours:** 72.00
Total Learning Hours: 240 **Private Study:** 168

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Practical	18.000
Tutorial	10.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		60.0	2.00
Practice	Inorganic		14.0	1.00
Report	Organic		13.0	1.00
Report	Physical		13.0	1.00

Aims

To develop knowledge in a range of chemical and biological mechanisms and understand the chemical structure and properties of a range of naturally occurring and synthetic molecules.

Learning Outcomes

After completing the module the student should be able to:

- 1 Discuss the structure and methods of isolation for a range of natural products
- 2 To calculate and derive expressions for the principal parameters that describe the kinetics and thermodynamics of enzymic systems.
- 3 To be able to discuss and compare chemical and enzyme catalysed nucleophilic substitution reactions.
- 4 Outline the synthesis and significance of amino acids and peptides.
- 5 To be able to demonstrate an understanding of the basic mechanistic steps behind classic named reactions and the utility of those processes in drug synthesis
- 6 Predict the outcome of substitution in aromatic compounds, using a knowledge of mechanism in such systems
- 7 To be able to discuss the bonding in organometallic complexes and how this relates to their stereochemical structures
- 8 To be able to conduct and evaluate data from a series of experiments involving the isolation, synthesis and kinetic study of a range of natural and synthetic molecules

Learning Outcomes of Assessments

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

Closed book examination	1	2	3	4	5	6	7
Inorganic Practical	8						
Organic Laboratory report	8						
Physical Laboratory report	8						

Outline Syllabus

- Introduction to the Chemistry of Life: Primary and Secondary metabolites, range and classes of natural products, isolation and extraction of natural products*
- Kinetics and Thermodynamics: Kinetics and thermodynamics as applied to enzymic processes: General characteristics of enzymes and the origin of steady-state kinetics. The thermodynamics of binding and reaction. The significance of the principal enzymic kinetic parameters, as applied to example mechanisms. Pre-steady state kinetics and the determination of enzyme concentration.*
- Chemical and Enzyme catalysed reactions: Nucleophilic substitution reactions of carboxylic acid derivatives. Synthesis and hydrolysis of esters and amides and kinetic resolutions. A comparison of chemical and enzyme catalysed reactions in terms of reaction conditions, mechanisms and stereoselectivity/specificity. Illustrated by examples of synthesis of natural and pharmaceutically relevant compounds.*

- *Peptides Synthesis and Therapeutics : Structure and properties of amino acids, synthesis of amino acids, biochemical and chemical reaction of peptides, formation of peptide linkage, synthesis of peptides, naturally occurring peptides, peptides therapeutics.*
- *Named Organic Reactions : To increase the students understanding of mechanism and reactivity by using named organic reactions. This will be delivered with specific reference to drug like molecules and with the aim of supporting later work on retrosynthesis.*
- *Aromatic Chemistry Structure and Reactivity : Further mechanistic treatment of electrophilic and nucleophilic substitution. Mono- and di- substitution. Directing effects.*
- *Organometallic Chemistry : Reactions of organic ligands with transition metals. The formation and bonding in complexes (including some of biological interest). General substitution reactions of transition metal complexes.*
- *Practical experiments : A range of experiments will be undertaken such as Grignard reaction, isolation of natural products, bromination of acetanilide, hydrolysis with enzymes.*

Learning Activities

Lectures, Practical Sessions, Computer Assisted Learning

References

Course Material	Book
Author	Solomons, TWG and Frhyle, CB
Publishing Year	2010
Title	Organic Chemistry
Subtitle	
Edition	10th
Publisher	Wiley
ISBN	9780470524596

Course Material	Book
Author	Atkins, P and Paula J De,
Publishing Year	2009
Title	Atkins' Physical Chemistry
Subtitle	
Edition	9th
Publisher	Oxford University Press
ISBN	978019954337

Course Material	Book
Author	Crabb,E , Moore, EA and Smart, LE
Publishing Year	2009
Title	Concepts in Transition Metal Chemistry

Subtitle	
Edition	
Publisher	RSC Publishing
ISBN	978-184973-060-0

Notes

This module will allow the students to develop knowledge in a range of chemical and biological mechanisms and understand the chemical structure and properties of a range of naturally occurring and synthetic molecules.