

Liverpool John Moores University

Title: Advanced Pharmaceutical Chemistry
Status: Definitive
Code: **6011CHACAP** (117496)
Version Start Date: 01-08-2011

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

Team	Leader
Barry Nicholls	Y
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Academic Level: FHEQ6 **Credit Value:** 24.00 **Total Delivered Hours:** 48.00

Total Learning Hours: 240 **Private Study:** 192

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	39.000
Practical	6.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	Essay		20.0	
Exam	Exam		60.0	3.00
Report	Prac		20.0	

Aims

To present and illustrate molecular and biomolecular chemical reactions and processes associated with drug development and synthesis and pharmaceutical applications

Learning Outcomes

After completing the module the student should be able to:

- 1 apply the principles of stereochemistry to chemical reactions in order to predict their stereochemical outcome
- 2 develop the chemistry of heterocycles to those containing more than one heteroatom
- 3 apply a suitable theoretical construct to predict the region and stereochemical outcomes of a range of reactions.
- 4 discuss the use of organometallic complexes in the catalysis of selected organic transformations
- 5 demonstrate an understanding of enolates and enamines in alkylation and condensation reactions of biological and pharmaceutical importance.
- 6 devise a multi-stage sequence for the chemical synthesis of an oligosaccharide
- 7 prepare and purify a pharmaceutically important compound
- 8 undertake simple assessments of the viability of reactions at various scales using thermodynamic, fluid dynamic and economic arguments.

Learning Outcomes of Assessments

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

Essay	1	4	6	
Examination	2	3	5	8
Practical	7			

Outline Syllabus

- Stereochemistry: conformational aspects of selected reactions – optimum conformation, molecular shape and reactivity; stereochemical control; neighbouring group participation*
- Chemistry of heterocycles containing two or more heteroatoms – effects on electron availability and thus type of reaction; effects on acidity and basicity; applications in / examples of drug and biomolecular action*
- Orbital Symmetry Controlled Reactions brings together electrocyclic, sigmatropic and cycloaddition reactions into one overarching theoretical construct to give a greater appreciation of the importance of orbital symmetry and electron demand in the prediction of reaction outcomes*
- Organometallic synthesis and catalysis, including catalytic hydrogenation and asymmetric hydrogenation and the synthesis of L-DOPA*
- Enolate Chemistry: An introduction to enolate and enamine chemistry. Alkylation and condensation reactions of carbonyl compounds. The aldol reaction in nature and stereoselective C-C bond formation*
- Synthesis of Oligosaccharides : Review of methods for the introduction and removal of suitable protecting groups. The use of different strategies and coupling*

reactions for chemical synthesis of the oligosaccharides will be illustrated.
Comparison with enzymic methods *Significance of synthetic oligosaccharides*

- *Laboratory synthesis of selected pharmaceuticals*
- *Large Scale Synthesis: gives an introduction to the problems of scale in synthetic chemistry with particular reference to the production of pharmaceuticals and the difficulty of scaling up laboratory reactions*

Learning Activities

Experiments, lectures and assignments

References

Course Material	Book
Author	Solomons, T.W.G
Publishing Year	
Title	Organic chemistry
Subtitle	
Edition	8
Publisher	John Wiley
ISBN	NY 0-471-44890-7

Course Material	Book
Author	Miljkovic, M
Publishing Year	2009
Title	Synthesis, Mechanisms and Stereoelectronic Effects
Subtitle	
Edition	
Publisher	Springer (New York)
ISBN	

Course Material	Book
Author	Hill, A.F
Publishing Year	2002
Title	Organotransition metal chemistry
Subtitle	
Edition	
Publisher	RSC Publishing
ISBN	978-0-85404-622-5

Course Material	CD/DVD
Author	Nicholls, B.S
Publishing Year	2009
Title	ChemiCAL

Subtitle	Homogeneous Catalysis
Edition	
Publisher	LJMU network
ISBN	

Course Material	Book
Author	Maitland J. Jr
Publishing Year	
Title	Organic Chemistry
Subtitle	
Edition	3
Publisher	W W Norton
ISBN	NY 0-393-92408-4

Course Material	Book
Author	Osborn, H and Khan, T
Publishing Year	2000
Title	Oligosaccharides :Their synthesis and biological roles
Subtitle	
Edition	
Publisher	Oxford University Press
ISBN	0-198-50260-5

Course Material	Book
Author	Waldmann, H
Publishing Year	2004
Title	Bioorganic Chemistry and Chemical Biology
Subtitle	
Edition	
Publisher	Wiley VCH
ISBN	3-727-30664-1

Notes

An in-depth study of more advanced chemistry involved in pharmaceutical processes