APPROVED

PHAR S7023: Pharmaceutical Drug Design

Module Details

Module Code:	PHAR S7023
Full Title:	Pharmaceutical Drug Design APPROVED
Valid From::	Semester 1 - 2018/19 (September 2018)
Language of Instruction:	
Duration:	1 Semester
Credits::	7.5
Module Owner::	
Departments:	Unknown
Module Description:	•To introduce the student to how the pharmaceutical industry designs medically active drug products, including both historical and current methods for pharmaceutical drug design. •To Introduce the student to a wide range of organic natural compounds especially ones, which have relevance in the pharmaceutical sector and to highlight to the student where these organic compounds can be found naturally. •To explain to the student some of the effects which these compounds have on biological metabolic systems.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Recognise the process used for designing a new active pharmaceutical ingredient (API).
MLO2	Discuss a range of naturally occuring products, their sources and uses or effects.
MLO3	Compare the organic structures of selected pharmaceutical drugs and the impact structural change has on drug efficacy.
MLO4	Practice a range of organic and analytical skills for multi-step synthesis of pharmaceutical and natural products.
MLO5	Apply current analytical skills during laboratory practicals to analyse synthesised phamaceutical compounds.
MLO6	Examine results from scientific practicals and discuss the importance in thesis type report.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).*
No recommendations listed

Module Indicative Content
The evolution of drug discovery Historical introduction, the first synthetic and chemotherapy drugs, nature as a drug source, from casual observations to systematic searches. Prodrugs.
Structure-activity relationship (SAR) Introduction to SAR, changing the organic structure (size and shape of the compound, new substituent), Case study (a SAR investigation), Quantitative structure-activity relationship (QSAR).
Terpenes and Carotenoids Isoprene rule, identifying isoprene units and classification (class and sub-class) of terpenes (including relevant examples). Carotenoids: structure, isoprene units, irregular terpene (including relevant examples).
Steroids Introduction, stereochemistry of the steroids, cholesterol and heart disease, steroid hormones (including, progesterone, testosterone, oestrogen, cortisol and cortisone). Vitamin D group. Medicinally useful steroids.
Alkaloids and azoles Introduction, classification, pharmaceutically relevant alkaloids: their structure, specific class and use. Pharmaceutically relevant azoles: their structure, classification and use.
DNA based chemotherapy drugs Purine and pyrimidine bases, nucleic acids and DNA structure. Anti-cancer drugs: types of binding/interaction with DNA structure, effect of drug on DNA structure and relevant examples. Other relevant pharmaceutical drugs based on either the DNA bases or nucleic acids.
Practical The students will work through multi-step synthesis of a pharmaceutical antibiotic (sulpha drug) over the course of the practicals using a variety of organic and analytical chemistry skills. In the above preparations where appropriate the students will use chromatographic and/or spectroscopic methods to check purity and identity of the products. At the end of the muti-step synthesis the students will indicate whether they have successfully completed the exercise and comment using thesis type report

Module Assessment

Assessment Breakdown	%
Course Work	10.00%
Practical	40.00%
Final Examination	50.00%

Module Special Regulation

Assessments

Full Time On Campus

Course Work

Assessment Type	Continuous Assessment	**% of Total Mark**	10
Marks Out Of	0	**Pass Mark**	0
Timing	S1 Week 8	**Learning Outcome**	2,3
Duration in minutes	0		

Assessment Description
In class test

No Project

Practical

Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	40
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	4,5,6
Duration in minutes	0		

Assessment Description
A 3-hour weekly practical session will provide the student with the opportunity to back up the theory covered in formal lectures and discussed in tutorials with practical experience. The students will work through multi-step synthesis of a pharmaceutical antibiotic (sulpha drug) over the course of the practicals using a variety of organic and analytical chemistry skills. The students will indicate whether they have successfully completed an exercise and comment appropriately using appropriate reports

Final Examination

Assessment Type	Formal Exam	**% of Total Mark**	50
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	1,2,3
Duration in minutes	0		

Assessment Description
End-of-Semester Final Examination

Reassessment Requirement

A repeat examination
Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

Module Workload

Workload: Full Time On Campus					
Workload Type	*Contact Type*	*Workload Description*	*Frequency*	*Average Weekly Learner Workload*	*Hours*
Lecture	Contact	No Description	Every Week	3.00	3
Practical	Contact	No Description	Every Week	3.00	3
Directed Reading	Non Contact	No Description	Every Week	3.00	3
Independent Study	Non Contact	No Description	Every Week	3.00	3
				Total Weekly Learner Workload	12.00
				Total Weekly Contact Hours	6.00

This module has no Part Time On Campus workload.

Module Resources

Recommended Book Resources

Bruice, P. (2011), Organic Chemistry, 6th. Pearson, [ISBN: 9780321697684].

Wermuth, C. (2008), The practice of medicinal chemistry, 3rd. Academic Press, [ISBN: 9780123741943].

Lednicer, D. (2010), Steroid chemistry at a glance, Electronic. Wiley, [ISBN: 9780470660850].

Palleros, D.R. Experimental Organic Chemistry, 1st. Wiley, [ISBN: 0471282502].

Supplementary Book Resources

Graham, P. (2001), Instant notes in medicinal chemistry, Oxford University Press, [ISBN: 1859962076].

Aniszewski, T. (2007), Alkaloids- secrets of life, Electronic. Elsevier, [ISBN: 9780444527363].

Dewick, P. (2009), Medicinal Natural Products- A biosynthetic approach, 3rd. Wiley, [ISBN: 9780470741689].

Watson, D. (2005), Pharmaceutical Analysis, 2nd. Churchill Livingstone, [ISBN: 044074453].

This module does not have any article/paper resources

Other Resources

Website, Dr Chiara Hanlon. Lecture notes and further resources, DkIT Moodle.

Website, Database for IR, MS, NMR information. Spectral Database for Organic Compounds (SDBS), http://sdbs.riodb.aist.go.jp/sdbs/cgi-bi n/cre_index.cgi

Chemistry drawing package, Organic chemistry drawing package (Biovia draw/Acceryls draw/Symxy draw).

Link, Library Catalogue, http://tinyurl.com/nvjtwug