Liverpool John Moores University

Title:	Natural Products Chemistry
Status:	Definitive
Code:	**7128PHASCI** (128776)
Version Start Date:	01-08-2021
Owning School/Faculty:	Pharmacy & Biomolecular Sciences
Teaching School/Faculty:	Pharmacy & Biomolecular Sciences

Team	Leader
Jose Prieto Garcia	Y
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Academic Level:	FHEQ7	**Credit Value:**	20	**Total Delivered Hours:**	42
Total Learning Hours:	200	**Private Study:**	158		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	23
Practical	9
Workshop	8

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	The exam will cover the delivered and recommended materials, key skills and learning outcomes.	60	2
Report	Report	Report on the Background, Methods, Results, Calculations and Interpretation of Laboratory and/or Workshop activities	40	1

Aims

This module aims to cover the phytochemical and medicinal chemistry (synthesis) aspects of natural products.
The theoretical Lectures will offer an overview of the major:
(1) Biosynthesis pathways (Shikimate, Mevalonic and aminoacid) of natural products (alkaloids, phenolics, terpenes, glycosides and essential oils);
(2) Fundamentals of organic synthesis;
(3) Use of online tools to explore the physicochemical characteristics of phytochemicals.

Learning Outcomes

After completing the module the student should be able to:

1	Demonstrate a thorough knowledge of the biosynthesis, structure and physico-chemical properties of natural products.
2	Demonstrate a thorough knowledge and practical understanding of how to apply organic chemistry to the semi/synthesis of natural products as well as selected online tools to support organic synthesis design.
3	Locate, critically evaluate, critically assess and make appropriate use of information from scientific literature and relevant electronic resources on phytochemistry and organic synthesis of natural products.
4	Demonstrate the necessary skills to plan, perform, report and interpret the results of laboratory experiments and analyses on the chemistry of natural products.

Learning Outcomes of Assessments

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

Exam	1	2
Report	3	4

Outline Syllabus

1. Plant Metabolism and Enzymes
2. Shikimate Pathway
3. Aminoacid Pathways
4. Mevalonic acid Pathway
5. Essential oils
6. Glycosides
7. Historical aspects of Natural Products Chemistry
8. Fundamentals of organic synthesis
9. Online tools and Databases for the study of natural products

Learning Activities

The theoretical Lectures will run in two parallel streams: the phytochemistry will cover in detail all the major classes of plant, fungal and microbial primary and

secondary metabolites of interest in natural products discovery. This includes the metabolites generated by the shikimate, mevalonate and aminoacidic pathways as well as their glycosides. The second stream will start by teaching historical aspects of Natural products direct synthesis to strengthen and illustrate the fundamentals of organic synthesis applied to natural products. This will be followed by the introduction and application of modern aspects such as retrosynthesis strategies and the use of electronic resources to inform semi synthesis.
Laboratory practical lectures (Approx. 3 h each) will give hands-on experience of each phytochemical class. For example, the first will consist on the Extraction + characterisation of essential oils, in a second session the Extraction + characterisation of alkaloids, etc.
These lectures may take the form of flipped classes if the number of students allows for a fair share of the load.
Workshops will be dedicated to the use and application of electronic databases and chemical software such as KEGG, TopSpin, Reaxys, Scifinder, etc.

Notes

This module will require previous undergraduate and/or postgraduate knowledge in organic chemistry.