



UNIVERSITI TEKNOLOGI MARA

CHM663: PHYTOCHEMISTRY

Course Name (English)	PHYTOCHEMISTRY APPROVED
Course Code	CHM663
MQF Credit	3
Course Description	This is an introductory course in phytochemistry, the chemistry of plants, one of the most important natural resources in our country. This course is aimed at giving the students some understanding on chemical compounds present in plants and the various methods of plant analyses. The course starts with a survey of the Malaysian medicinal plants. This is followed by topics on basic phytochemical methods, the different classes of compounds/secondary metabolites usually present in plants, such as terpenoids, steroids, alkaloids, flavonoids and quinones as well as biosyntheses of selected secondary metabolites. Discussion on the application of spectroscopic data in the structural determination of selected secondary metabolites is also included. The course concludes with a topic on drug development from phytochemicals.
Transferable Skills	Students understand medicinal plants, their biological activities and classes of secondary metabolites and their biosynthetic pathways. Students are able to use spectroscopic data in structural determination of some secondary metabolites.
Teaching Methodologies	Lectures, Blended Learning, Field Trip, Small Group Sessions
CLO	CLO1 Explain aspects of Malaysian medicinal plants, their bioactivities, methods of plant analyses, the different classes of secondary metabolites present in plants as well as the biosynthetic pathways of selected secondary metabolites CLO2 Utilize modern spectroscopic data in structural determination of selected classes of secondary metabolites. CLO3 Discuss the importance of plants in drug discovery and development. CLO4 Write a report of a project with peer groups.
Pre-Requisite Courses	No course recommendations
Topics	1. Introduction : Malaysian Medicinal Plants 1.1) 1.1 Botany 1.2) 1.3) 1.2 Traditional uses 1.4) 1.5) 1.3 Biological activity 1.6) 1.7) 1.4 Phytochemical screening – alkaloids, flavonoids, terpenoids, steroids and saponins 2. Methods of Plant Analysis 2.1) 2.1 Extraction and Fractionation – percolation, maceration, soxhlet, supercritical fluid extraction (SFE) 2.2) 2.3) 2.2 Separation and isolation – column chromatography, radial chromatography, vacuum liquid chromatography, high performance liquid chromatography 2.4) 2.5) 2.3 Detection methods (spraying reagents) for alkaloids, flavonoids, terpenes and steroids 2.6) 2.7) 2.4 Identification using spectroscopic methods

3. Terpenoids 3.1) 3.1 Essential Oils – General properties, methods of extraction, analyses and its applications e.g. in perfumery and pharmaceutical industries 3.2) 3.3) 3.2 Diterpenoids 3.4) 3.5) 3.3 Triterpenoids and steroids 3.6) 3.7) 3.4 Carotenoids 3.8) 3.9) 3.5 Biosyntheses of selected terpenoids
4. Steroids 4.1) 4.1 Nomenclature, structures, configuration and conformation 4.2) 4.3) 4.2 Examples of steroids and their biological activities 4.4) 4.5) 4.3 Biosyntheses of selected steroids
5. Phenolic Compounds 5.1) 5.1 Simple phenolic compounds 5.2) 5.3) 5.2 Flavonoids 5.4) 5.5) 5.3 Quinones 5.6) 5.7) 5.4 Coumarins 5.8) 5.9) 5.5 Biosynthesis of flavonoids
6. Alkaloids 6.1) 6.1 Quinoline alkaloids 6.2) 6.3) 6.2 Isoquinoline and benzyloquinoline alkaloids 6.4) 6.5) 6.3 Indole alkaloids 6.6) 6.7) 6.4 Biosyntheses of selected alkaloids
7. Structural Determination of Natural Compounds: Use of Modern Spectroscopic techniques 7.1) 8.1 Ultra violet and infra red spectroscopy 7.2) 8.2 Nuclear magnetic resonance and mass spectrometry
8. Drug Development from Natural Products 8.1) 9.1 Taxol, vincristine , vinblastine and anti-HIV

Assessment Breakdown		%	
Continuous Assessment		100.00%	

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Student writes on a plant species	20%	CLO3
	Assignment	Group writes about an organization on natural products	20%	CLO4
	Test	Test 1: Chapters 1,2,3 and 4	30%	CLO1
	Test	Test 2: Chapters 5,6,7 and 8	30%	CLO2

Reading List	Reference Book Resources	
		<ul style="list-style-type: none"> • Bhat, S V 2005, <i>The Chemistry of Natural Products</i>, 2nd Edition Ed., 12, Narosa Publishing House [ISBN: 8173194815] • Paul M. Dewick 2009, <i>Medicinal Natural Products: A Biosynthetic Approach</i>, 3rd Edition Ed., 8, Wiley [ISBN: 0470741678] • Harborne, J B 1998, <i>Phytochemical Methods. A Guide to Modern Techniques of Plant Analysis</i>, 3rd edition Ed., 7, Chapman Hall London [ISBN: 0-412-57260] • Peter Houghton, Amala Raman 2012, <i>Laboratory Handbook for the Fractionation of Natural Extracts</i>, 1st edition Ed., 10, Springer Science & Business Media [ISBN: 1461558093]

Article/Paper List	Reference Article/Paper Resources	
		<ul style="list-style-type: none"> • Toh-Seok Kam 1998, Alkaloids from <i>Kopsia dasyrachis</i>, <i>Phytochemistry</i>, vol 51, 159 http://doi:10.1016/S0031-9422(98)00721-3 • Stefan Gafner 2011, Isoflavonoids and Coumarins from <i>Glycyrrhiza uralensis</i>, <i>Journal of Natural Products</i>, vol 74, 2514 • Shachi Singh 2012, Phytochemical Analysis of Different Parts of <i>Prosopis juliflora</i>, <i>International Journal of Current Pharmaceutical Research</i>, vol. 4 [ISSN: 0975-7066]

Other References	
	This Course does not have any other resources