



FORMEN CHRISTIAN COLLEGE, LAHORE
(A Chartered University)
Chemistry Department

Course outline **Chem-541**

Chemistry of Isoprenoids and Polyphenols

Credits: 03

Instructor: Dr Seemal Jelani

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WhatsApp group: 0300494687

All students must send an email indicating whether they agree to have their names added to the class academic WhatsApp group.

Visiting hours: 12:00-1:00 (except Wednesday)

Course contents:

Natural products and their importance; distribution and synthesis of terpenoids, steroids and polyphenols in living organisms; isolation, structure, reactivity and medicinal activities of terpenoids; total synthesis of some representative terpenoids; Structure and reactivity of flavonoids and isoflavonoids, coumarins, saponins and glycosides; isolation techniques; medicinal applications of polyphenols and flavonoids.

Course objectives:

1. Students will acquire knowledge about different types of natural products with emphasis on their structure, synthesis and applications.
2. Using the selected examples, this course describes the process of identification and isolation of natural products from natural sources, their chemical synthesis, biological activities ecological relevance and possible applications in the fields of pharmacology and biomedicine
3. Present natural products sources and various metabolites found in nature
4. Present examples of natural products and some simple biosynthetic pathways showing how metabolites are formed in nature
5. Describe approaches to isolating natural products from natural sources

Learning outcomes:

Upon completion, students will be able to:

- 1) Identify key classes of natural products and the building blocks used in Nature
- 2) Use approaches to isolate natural products from various sources
- 3) Understand difference between primary and secondary metabolites
- 4) Elucidate Structure and cognize reactivity of flavonoids and isoflavonoids, coumarins, saponins and glycosides.

Explore medicinal applications of polyphenols and flavonoids

Catalogue Course Content

Natural products and their importance; distribution and synthesis of terpenoids, steroids and polyphenols in living organisms; isolation, structure, reactivity, and medicinal activities of terpenoids; total synthesis of some representative terpenoids; Structure and reactivity of flavonoids and isoflavonoids, coumarins, saponins and glycosides; isolation techniques; medicinal applications of polyphenols and flavonoids.

Recommended Books:

1. Dewick, P. M., Medicinal Natural Products: A Biosynthetic Approach, 3rd ed., Medicinal Natural Products, John-Wiley & Sons, Ltd., (2009).
2. Sell, C. S., A Fragrant Introduction to Terpenoid Chemistry, The Royal Society of Chemistry, UK, (2003).
3. De la Rosa, L. A., Parrilla, E. A. and Aguitar, G. A. G., Fruit and Vegetable Phytochemicals: Chemistry, Nutritional Value and Stability, Wiley-Blackwell, (2009).
4. Shahidi, F. and Naczk M., Phenolics in Food and Nutraceuticals, CRC Press, (2004).
5. Oyvind, M. A., and Kenneth, R. M., Flavonoids: Chemistry, Biochemistry and Applications, CRC, Taylor & Francis, New York, (2010).
6. Finar, I. L., Organic Chemistry, Vol. 2, Stereochemistry and the Chemistry of Natural Products, 5th ed., Pearson Education Ltd., Delhi, (2008).
7. Hesse, M., Alkaloid Chemistry, John-Wiley & Sons, New York, (1981).

Assessment

No	Rubric	Weightage %
1	Attendance & Class participation	10
3	Quizzes	10
4	Assignment	10
6	Presentation	10
7	Project	10
8	Mid exam	20
9	Final Exam	30
100	Total	100

Eligibility criteria

A student must be regular and punctual. Generally, he or she should attend all classes. 80 percent attendance is expected to sit for the final exam.

Week Plan/Semester Breakup

Week	Course content	Assessment
Week-01&2	<p>Discussing course outlines Students' introduction Introduction Natural products Natural products and their importance Natural product function, primary and secondary metabolites, sources, and distribution Properties and Purpose of Secondary Metabolites Ethnobotany and Traditional Sources of Natural Products, Sourcing of Natural Products, Sources of Microbes, Marine Sources, Animal Sources Venoms and Toxins</p>	
Week -03 &4	<p>Terpenoids: Isoprene unit, sources, classification, structures, and synthesis in living organism, isolation techniques Isoprenoids = Terpenes = Terpenoids Compounds Derived from 5 Carbon Units The Mevalonic Acid Pathway</p>	<p>Quiz-01 Assignment 1</p>
Week-05-06	<p>Steroids: sources, classification, structures, and synthesis in living organism</p>	<p>Quiz-02 Assignment 2 An academic visit that must be approved by the visit site</p>
Week-07-08	<p>Isolation, structure, reactivity, and medicinal activities of terpenoids</p>	<p>Mid Exam</p>
Week-09-10	<p>Total synthesis of some representative terpenoids</p>	<p>Assignment 3</p>
Week-11-12	<p>Polyphenols: sources, classification, structures, Chemical Constituents and Structure of Polyphenols and synthesis in living organism. The biosynthetic pathways of polyphenols include the shikimic acid and phenylpropanoid metabolism pathway</p>	<p>Assignment 4 Quiz-03</p>
Week-13	<p>Structure and reactivity of flavonoids and isoflavonoids, coumarins, saponins and glycosides</p>	<p>Assignment 5 Quiz-04</p>
Week 14	<p>Isolation techniques; medicinal applications of polyphenols and flavonoids.</p>	
Week-15	<p>Natural product drug discovery in the artificial intelligence era</p>	
Week-16	<p>Final Exam</p>	

