



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Pharmacy College
Semester-5 (B. Pharm.)

Subject: Pharmacognosy and Phytochemistry II - BPHBP15323

Type of course: Major

Prerequisite: Pharmacognosy and Phytochemistry-I

Rationale: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites is produced in the crude drugs, how to isolate and identify and produce them industrially. Also, this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	1	4	6	75	25	10	25	15	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr No.	Course content	Hrs	% Weightage
1.	Metabolic pathways in higher plants and their determination a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.	7	15



2.	General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites: Alkaloids: Vinca, Rauwolfia, Belladonna, Opium, Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander, Tannins: Catechu, Pterocarpus Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony Glycosides: Senna, Aloes, Bitter Almond Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids	10	25
3.	Isolation, Identification and Analysis of Phytoconstituents a) Terpenoids: Menthol, Citral, Artemisin b) Glycosides: Glycyrrhetic acid & Rutin c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine d) Resins: Podophyllotoxin, Curcumin	10	25
4.	Industrial production, estimation and utilization of the following Phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine	10	20
5.	Basics of Phytochemistry Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.	8	15

Practical List:

Sr.No	Descriptions	Hrs
1	A. Section Cutting Techniques, B. Introduction to Plant Tissue System	6
2	To study Morphology, Microscopy, and Powder Characteristic of Cinnamon Bark.	4
3	To study Morphology, Microscopy, and Powder Characteristic of Senna	4
4	To study Morphology, Microscopy, and Powder Characteristic of Fennel	4
5	To study Morphology, Microscopy, and Powder Characteristic of Coriander	4
6	To study Morphology, Microscopy, and Powder Characteristic of Clove	4
7	To study Morphology, Microscopy, and Powder Characteristic of Ephedra	4
8	Isolate Caffeine from Tea leaves and Perform TLC of Isolated Caffeine	6
9	Analysis of Crude drug by chemical test : Asafoetida, Colophony, Myrrh	6
10	Analysis of Crude drugs by Chemical test: Aloe, Benzoin, Guggul	6
11	Estimation of Sennoside from Senna leaf Powder and Marketed Formula.	6
12	Isolation and Detection of atropine from belladonna leaf Powder.	6
	Total	60



Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	Traditional Uses vs. Modern Applications of Medicinal Plants Faculty Will Provide the Modern name of the drug and students will investigate the traditional uses of plants in folk medicine compared to their scientifically proven therapeutic applications today and prepare the report and submit on the GMIU web Portal.	10
2.	Phytochemical Screening of Common Herbal Drugs: A Comparative Study Faculty will provide the Five Drug Name and Students compare the phytochemical profiles of commonly used herbal drugs (e.g., ashwagandha, ginger, peppermint) and their therapeutic potentials. Students will review literature on given herbal drugs, their phytochemicals (e.g., alkaloids, terpenes, flavonoids), and compile a comparative analysis of their medicinal properties and applications and submit the hard copy in A3 size and the PDF file submit on the GMIU web portal.	5
Total		15

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	15%	25%	20%	15%	15%	10%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand modern extraction techniques and apply them for the characterization and identification of herbal drugs and phytoconstituents.
CO2	Comprehend the biosynthesis, classification, and therapeutic significance of secondary metabolites in plants.
CO3	Isolate specific phytoconstituents and apply analytical methods for their identification.
CO4	Understand the process of phytoconstituents isolation and identification at the industrial level, including quality control and standardization techniques.
CO5	Apply modern methods of extraction to isolate phytoconstituents effectively.



Instructional Method:

The course delivery for **Pharmacognosy and Phytochemistry** will combine traditional blackboard teaching with interactive methods such as demonstrations, role plays, quizzes, and brainstorming sessions. About 10% of the content will be taught using a flipped classroom approach, where students will review material online before class for deeper in-class discussions. Supplementary resources like NPTEL/SWAYAM courses, e-courses, and virtual labs will be used to reinforce learning.

Internal evaluation will be based on active learning assignments, and practical/viva exams at the end of the semester will assess students' laboratory skills and theoretical knowledge. This approach ensures a balanced and engaging learning experience.

Reference Books:

- [1]. W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
- [2]. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
- [3]. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhale (2007), 37th Edition, Nirali Prakashan, New Delhi.
- [4]. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
- [5]. Essentials of Pharmacognosy, Dr. SH. Ansari, 11th edition, Birla publications, New Delhi, 2007
- [6]. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
- [7]. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
- [8]. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
- [9]. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor. The formulation and preparation of cosmetic, fragrances and flavours.
- [10]. Remington's Pharmaceutical sciences.
- [11]. Text Book of Biotechnology by Vyas and Dixit.
- [12]. Text Book of Biotechnology by R.C. Dubey