Chitkara College of Pharmacy
Chitkara University, Rajpura, Punjab
Chandigarh–Patiala National Highway, Punjab – 140 401, India

Institute/School Name	Chitkara College of Pharmacy		
Department Name	Pharmacy		
ProgrammeName	B.Pharmacy		
Course Name	Pharmacognosy and Phytochemistry II (Theory)	**Session**	July-Dec 25
Course Code	BP504 T	**Semester/Batch**	V/2023
L-T(Per Week)	3-1	**Course Credits**	4
Pre-requisite	Pharmacognosy	**NHEQF Level**	5.5
Course Coordinator	Dr. Avneet Kour		
SDG	9,12		

Objectives of the Course: Upon completion of the course, the student shall be able to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents; to understand the preparation and development of herbal formulation; to understand the herbal drug interactions and to carryout isolation and identification of phytoconstituents.

Course Outcomes (COs)

Students should be able to:

	COs	**Program Outcomes (PO)**	**NHEQF Level Descriptor**	**No. of Lectures**
CO01	Study the basic metabolic pathways and formation of different secondary metabolites through the Shikimic acid pathway, acetate pathways, and amino acid pathway	2	Q1	**10**
CO02	Understand the general introduction, composition, chemistry, chemical classes, bio sources, therapeutic uses, and commercial applications of secondary metabolites.	1,3,10	Q2	**14**
CO03	Isolate, identify, and analyze phytoconstituents, including terpenoids and steroids	1,2,3,9,10	Q2, Q3	**6**
CO04	Examine the biological activities of several compounds belonging to polyketides, terpenoids, and steroids, and their traditional use and application in the Pharmaceutical and/or nutraceutical field.	1,2,3,9,11	Q5	**10**
CO05	Understand the basics of phytochemistry research		Q4	**12**
Total Contact Hours				**52**

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Type of Assessment's
CO01		2										Summative/ Formative
CO02	2		2							2		Summative/ Formative
CO03	2	3	3						3	2		Summative/ Formative
CO04	3	3	2	3					2			Summative/ Formative
CO05												Summative/ Formative

3=High, 2=Medium,1=Low

Recommended Books:

B01: W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders and Co., London, 2009.
B02. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers and Distribution, New Delhi.
B03. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Ed, Nirali Prakashan, New Delhi.
B04. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
B05. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
B06. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
B07. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
B08. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
B09. Pharmacognosy and Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
B10. The formulation and preparation of cosmetic, fragrances and flavours.

Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://www.sciencedirect.com/topics/medicine-and-dentistry/shikimic-acid
2.	https://www.studocu.com/in/document/global-college-of-pharmaceutical-technology/pharmacy/bp504t-pgpc-unit-i-notes/41233622
3.	https://pharmdbm.com/pharmacognosy-and-phytochemistry-2-notes-download/
4.	https://link.springer.com/book/10.1007/978-1-4612-3006-9

Lecture Plan

Lec no.	Topic	Book no, Ch no, page no.	TLM	ALM	Web References	Audio-video
1-10	Metabolic pathways in higher plants and their determination: a) Brief study of basic metabolic pathways and formation of different	B01, CH 14, Page no. 201-236 B01, CH 14, Page no. 236 B01, CH 13, Page no. 173	Lecture, Active learning, Discussion, Questioning	Group Discussion, Student-Created Ppt, Quiz/Test Questions	https://link.springer.com/chapter/10.1007/978-1-4615-4913-0_7 https://www.sciencedirect.com/science/article/abs/pii/0006300253901437 https://www.annualreviews.org/content/journals/10.1146/annurev-arplant-042811-105439	

	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.	B01, CH 12, Page no. 151 B01, CH 3, Page no. 33 B01, CH 3, Page no. 33 B01, CH 3, Page no. 35 B03, CH 6, Page no. 141				
11-24	General introduction, composition, chemistry and 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 and 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 and Naphthaquinones: Gentian,	B03, CH 12, Page no. 311 B03, CH 11, Page no . 254 B03,CH08,Page no.122 B03,CH07,CHO5, CHO8,Page no.90,57 and 111 B01,CH25,CH34, CH26,CH09, Page no.341,477,137,372	Lecture, Active learning, Discussion, Questioning	Group Discussion, Student-Created Ppt, Quiz/Test Questions	https://link.springer.com/chapter/10.1007/978-3-319-63862-1_9	

	Artemisia, taxus, carotenoids.					
25-31	Isolation, Identification and Analysis of Phytoconstituents: a) Terpenoids: Menthol, Citral, Artemisin; b) Glycosides: Glycyrhetinic acid and Rutin; c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine; d) Resins: Podophyllotoxin, Curcumin.	B01, CH29, CH27, Page no.437, 388 B01, CH29, CH27, Page no.437, 388 B01,CH38,CH39, Page no.525, 540	Lecture, Active learning, Discussion, Questioning	Group Discussion, Student-Created Ppt, Quiz/Test Questions	https://wjpsonline.com/index.php/wjps/article/view/source-isolation-impact-glycone-aglycone-human-body	
32-41	Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine.	B01,CH37, Pg number 510 B01,CH39, Pg number 540 B01,CH40, Pg number 550 B01,CH40, Pg number 550	Lecture, Active Lecture, Active learning, Discussion, Questioning	Group Discussion, Student-Created Ppt, Quiz/Test Questions	https://link.springer.com/chapter/10.1007/978-3-319-45776-5_6	
42-52	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	Ch-4, 61-71	Lecture, Active learning,	Group Discussion, Discussion Student-Created Ppt, Quiz/Test Questions	https://www.sciencedirect.com/science/article/pii/S0031942207005122	

Teacher in-charge Assistant Dean Dean