



Dr. Rafiq Zakaria Campus

Maulana Azad Educational Trust's

Y. B. CHAVAN COLLEGE OF PHARMACY

(B. Pharm, M. Pharm & Research Centre)

ISO 21001:2018 & ISO 14001:2015 CERTIFIED | NIRF-2022 ALL INDIA RANK 65TH

NAAC ACCREDITATION "A" GRADE WITH 3.23 CGPA SCORE

COURSE MODULE

Program Title	B. Pharmacy
Department	Pharmacognosy
Course Title	Pharmacognosy and Phytochemistry II

1. **NAME OF INSTITUTION :** Y. B. CHAVAN COLLEGE OF PHARMACY,
AURANGABAD
2. **AFFILIATED UNIVERSITY :** DR. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY, AURANGABAD
3. **DEPARTMENT :**
4. **PROGRAM TITLE :** B. PHARM.

4.1. Program Outcomes (PO):

PO 01: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 02: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO 03: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 04: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 05: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO 06: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 07: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 08:Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO 09:The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10:Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

5. COURSE SPECIFICATION :

5.1. Course Identification and General Information

a. Course Title:	Pharmacognosy and Phytochemistry II	
b. Course Number/Code	504 T	
c. Credit Hours	Theory	Practical
	45(3 Hrs/Week	60 (4Hrs. / Week)
d. Study level/semester at which this course is offered	FIFTH	
e. Pre-requisite	Pharmacognosy and Phytochemistry I	
f. Co-requisite	Pharm Jurisprudence	
g. Program in which the course is offered	B Pharm	
h. Language of teaching the course	English	
i. Prepared by	Dr. Abubakar Salam Bawazir	
j. Approved by HOD	Mrs Reshma Toshniwal	

5.2. Course Description:

The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are 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.

5.3. Course Objectives:

1. To know how the secondary metabolites are prepared in Plants.
2. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.
3. To understand the extraction, isolation and estimation of phytoconstituents from crude drug.
4. To understand the industrial production of phytoconstituents.
5. To know latest and modern analytical methods of chromatographic and spectroscopic analysis.

6.0. Course Outcomes (COs) : (Min. 4 and Max. 6)**(Use Bloom's Taxonomy words)**

CO Code	Course outcome
504.01	Ability to know how the secondary metabolites are prepared in Plants
504.02	Understanding Pharmacognostic account of medicinal plants
504.03	Applying the knowledge of extraction and isolation of active principle responsible for Pharmacological action.
504.04	Understand will apply modern analytical methods for estimation of phytoconstituents qualitatively and quantitatively and phytoconstituents for industrial production.
504.05	Ability to know basics of Phytochemistry and latest methods and techniques in chromatography and spectroscopic analysis.

6.1. Knowledge and Understanding**(Alignment of POs to COs)**

CO Code	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
504.01	2	2	2	2	-	-	1	-	1	2	1
504.02	3	2	2	3	-	1	1	-	1	3	1
504.03	3	3	2	3	1	-	1	-	-	-	1
504.04	3	2	1	2	-	-	-	-	-	2	2
504.05	3	1	1	3	2	-	-	-	1	2	1

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low); 2: Moderate (Medium); 3: Substantial (High); If there is no correlation, put '-'

6.2. Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
Lectures (Constructivist learning) Collaborative learning (Discussion) Project based Learning Blended learning Inquiry based learning Flash cards Video Equipment models	Formative Assessment Case study Class test Multiple choice questions Assignments Seminar Viva Voce Synopsis Tutorials Summative Assessment

6.3. Tools for the Teaching and learning

Theory subjects	Practical Subjects
<ul style="list-style-type: none">• PowerPoints presentation• Videos• Flash Card• Models• Software• Charts• Smart Boards• White boards• Online Platform	<ul style="list-style-type: none">• White boards• Glassware• Chemicals• Instruments• Equipment• Software• Models• Plants/Crude Drugs

6.4. COURSE CONTENT

6.1.

Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	Unit I	UNIT-I 7 Hours 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.	2.5	07
2	Unit II	UNIT-II 14 Hours 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	4.5	14
3	Unit III	UNIT III 06 Hours 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	2	06
4	Unit IV	UNIT IV 10 Hours Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine	3.5	10
5	Unit V	UNIT V 8 Hours 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. 119	2.5	08
	TOTAL			45

6.2.**Practical Aspects**

Order	Name of Experiment	Number of Weeks
1	To perform morphology, powder characteristics, extraction and detection of Cinchona, Cinnamon and Clove	01
2	To perform morphology, powder characteristics, extraction and detection of Senna and Ephedra	01
3	Fennel and Coriander	01
4	Exercise involving isolation and detection of active principles Caffeine from tea dust	01
5	Diosgenin from Dioscorea	01
6	Separation of Sugars by paper chromatography	01
7	Preparation of herbal cosmetics	01
8	TLC of herbal extract	01
9	Distillation of volatile oils and detection of phytoconstituents by TLC	01
10	Analysis of crude drug by chemical tests asafetida, benzoin, colophony, aloes and myrrh.	01

7.0. ASSESSMENT MECHANISM :

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
1	Assignments, Exercises & Home works	2 nd week of every month	10	6%
2	Sessional (Internal Theory exam)	As per scheduled examination	15	10%
3	Continuous Practical Assessment (Sessional Practical exam)	Weekly during practicals	15	10%
4	Final exam (theory)	As per University at end of course	75	50%
5	Final exam(practical)		35	24%
Total			150	100%

8.0. STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	

9.0. TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	10:00-1:00	10:00-1:00	10:00-1:00	1:00-2:00	1:00-2:00	1:00-2:00

10.0. LEARNING RESOURCES:

Sr.No.	Title of Learning Material	Details
1	Text books	1. Textbook of Pharmacognosy by Trease & Evans. 2. Pharmacognosy by Kokate, Purohit and Gokhale 3. Mohammad Ali, Pharmacognosy and Phytochemistry CBS Pub. 4. Herbal drug industry by R D Choudhary
2	Essential references (as per syllabus)	1. Textbook of Pharmacognosy by Trease & Evans. 2. Textbook of Pharmacognosy by Tyler, Brady & Robber. 3. Pharmacognosy by Kokate, Purohit and Gokhale 4. Herbal Drug Technology by Agrawal 4. Essential of Pharmacognosy by Dr.S.H.Ansari 5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy) 7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
3	Reference material	Pharmacopoeas (IP, USP, BP, IHP, IAP)
4	E-materials and websites	
5	Other learning material	

11.0. FACILITIES REQUIRED:

Sr.No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

12.0. COURSE IMPROVEMENT PROCESSES:

12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms and online questionnaires

12.2. Other strategies for evaluation of teaching by the instructor or by the department:

Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

12.4. Describe the planning procedures for periodically reviewing of course effectiveness and planning for improvement:

Periodic review by departmental meeting , Review of course delivery and outcome through assessment and feedback from all stake holders.

12.5. Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

13.0. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

Name	Dr. Abubakar Bawazir salam
Location	Cabin, Third floor, near exam Dept.
Contact Detail (e-mail & cell no.)	9823283334
Office Hours	10:00 AM to 5:00 PM

Name	Dr. Subur W. Khan
Location	Cabin, Third floor, near staff room, PA lab
Contact Detail (e-mail & Cell No.)	8055347943
Office Hours	10:00 AM to 5:00 PM