



Gyanmanjari
Innovative University

Course Syllabus

Gyanmanjari Institute of Technology
Semester-5

Subject: Herbal Biotechnology- BETBT15316

Type of course: Department Elective - II

Prerequisite: Basic knowledge of Biology, Chemistry, Fundamentals of Biochemistry and Molecular Biology.

Rationale: Herbal Biotechnology is a specialized branch of biotechnology that focuses on the scientific study and technological improvement of medicinal plants to enhance the production, quality, and utilization of plant-based therapeutics. The rationale behind this field is rooted in the convergence of traditional herbal knowledge and modern biotechnological tools.

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	0	2	4	60	30	10	20	30	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:

Unit No.	Course content	Hours	% Weightage
1	Herbs as raw materials and Indian systems of medicine: History, Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs., Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma., Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.	08	20
2	Basics of phytochemistry and Industrial production of Phytoconstituents: Application of latest techniques like Spectroscopy, chromatography, and electrophoresis in the isolation,	14	



	Purification, and identification of crude drugs., Industrial production, estimation, and utilization of : Forskolin, Caffeine, Atropine		
3	Herbal Cosmetics: The scope, historical background, and present status of herbal cosmetics, Herbal skin care cosmetics (Cleansing agents and Skin Pigmentation), Hair structure and physiology (Herbal hair care cosmetics and Hair grooming), Herbs used as antioxidants, antiseptic, antibacterial, anti-fungal.	15	30
4	Herbal Drug Industry: Scope, Study of infrastructure, Plant and equipment, Research, and development., Quality assurance concept, GMP & ISO-9000 in herbal drug industry., WHO & ICH guidelines for the assessment of herbal drugs, Stability testing of herbal drugs.	08	20

Continuous Assessment:

Sr. No.	Active Learn	Marks
1	Digital Compilation of Medicinal Plants and Their Uses: Students will prepare E-herbarium detailing 10–15 plants, including: Botanical name, Active constituents, Biotechnological relevance (e.g., tissue culture, metabolic engineering), Therapeutic applications and submit on GMIU web portal.	10
2	Report Preparation: Students will prepare report on any five medicinal plants use in medical field and routine life and submit on GMIU web Portal.	10
3	Molecule Mapping Activity: Students create a molecular map for Forskolin, Atropine, and Caffeine showing source, extraction, and use and submit it on GMIU web portal.	10
Total		30

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	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 the above table.

List of Practical

Sr. No	Title	Hours
1.	Collection and Identification of Medicinal Plants.	2
2.	Determination of moisture content and particle size.	2
3.	Separation of various medicinal plant pigment by using thin layer chromatography.	2
4.	Check the antimicrobial activity of medicinal plates by disk method.	

5.	Check the antimicrobial activity of medicinal plates by cup borer method.	2
6.	Check the antimicrobial activity of medicinal plates by ditch method.	2
7.	Microscopic Study of Medicinal Plants.	2
8.	Spectrophotometric analysis of herbal extracts for total phenolic or flavonoid content.	2
9.	Testing of herbal cosmetics for pH, viscosity, spreadability, and stability.	2
10.	Design of a protocol for stability testing of a herbal formulation.	2
11.	Mini Project on Product Development.	10
Total		30

Course Outcome:

After learning the course, the students should be able to:

CO1	Describe the historical development, classification, and preparation methods of Ayurvedic herbal formulations.
CO2	Explain the basic principles of phytochemistry and interpret various methods for extraction and analysis of phytoconstituents.
CO3	Demonstrate the ability to prepare and evaluate herbal cosmetics based on herbal ingredients and their applications.
CO4	Evaluate the quality assurance systems such as GMP, ISO-9000, and WHO guidelines in the herbal drug industry.

Instructional Method:

The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by blackboard, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content, 10% of topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done based on the Active Learning Assignment

Reference Books:

- [1] Herbal Drug Technology by S.S. Agrawal & M. Paridhavi
- [2] Pharmacognosy and Phytochemistry by Vinod D. Rangari
- [3] Medicinal Plants: Chemistry and Properties by N.K. Dubey
- [4] Biotechnology of Medicinal Plants by K.G. Ramawat
- [5] Herbal Medicine: Biomolecular and Clinical Aspects (2nd Edition) by Iris F.F. Benzie & Sissi Wachtel-Galor

