University of Kerala

Discipline	**BOTANY**				
Course Code	**UK4DSEBOT201**				
Course Title	**HERBAL TECHNOLOGY**				
Type of Course	**DSE**				
Semester	**IV**				
Academic Level	**200 - 299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	04	03 Hours	-	02 Hours	05Hours
Pre-requisites	No Pre-requisites				
Course Summary	This course gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP).				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		**Herbs & Industrial Application**	**08**
	1	Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation, Selection, identification and authentication of herbal materials, Processing of herbal raw material.	
	2	Indian Systems of Medicines- Ayurveda, Siddha, Unani and Homeopathy (Basic principles), Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.	
	3	General Introduction - Herbal Industry- Herbal drugs industry: Present scope and prospects.	
	4	A brief account of plant-based industries and institutions involved in work on medicinal and aromatic plants in India	
II		**Cultivation of Medicinal plants**	**07**
	5	Agricultural practices for the cultivation of medicinal plants- *Aloe vera, Centella asiatica, Curcuma longa.*	
	6	Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides	
III		**Herbal Nutraceuticals & Cosmetics**	**08**
	7	General aspects, Market, growth, scope, and types of products available in the market.	
	8	Health benefits and role of herbal nutraceuticals in ailments like Diabetes, Cardiovascular diseases, Cancer, Gastrointestinal diseases.	
	9	Study of herbs as health food: Ginger, Fenugreek, Garlic, Amla, Ashwagandha, Turmeric, Pepper.	

	10	Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums, colors, perfumes, protective agents, bleaching agents, and antioxidants in products such as skin care, hair care, and oral hygiene products	
IV	**Herbal excipients & formulations**		**07**
	11	Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavours & perfumes.	
	12	Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes	
V	**Evaluation of Drugs**		**15**
	13	WHO & ICH guidelines for the assessment of herbal drugs. Stability testing of herbal drugs.	
	14	Components of Good Manufacturing Practices (Schedule – T) and its objectives.	
	15	Infrastructural requirements, working space, storage area, machinery and equipment, standard operating procedures, health and hygiene, documentation and records	

Practicals		
	1. Identify herbal drug sources based on morphological characters. 2. Perform preliminary phytochemical screening (Qualitative) of crude drug formulations (Aristas, Asawas, Ghutika, Churna, Lehya and Bhasma)- Saponins, flavonoids, alkaloids, phenols, steroids, terpenoids, glycosides. 3. Preparation of herbal cosmetics- Aloe vera gel, face cream, face pack, herbal shampoo & hair oil 4. Quantification of flavonoids, Phenol and total alkaloid content in herbal samples (Demonstration only) 5. Monograph analysis and documentation of herbal drugs from recent Pharmacopoeias	**30**

Suggested Reading

1. Trease & Evans. Textbook of Pharmacognosy
2. Tyler, Brady & Robber. Textbook of Pharmacognosy
3. Purohit and Gokhale. Pharmacognosy by Kokate.
4. Dr.S.H.Ansari Essential of Pharmacognosy
5. V.D.Rangari. Pharmacognosy & Phytochemistry
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in
7. Indian Medicine & Homeopathy)
8. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of
9. Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

Course Outcomes

No.	Upon completion of the course, the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Students will be able to understand the herbal raw material as a source of herbal drugs	U	PSO-3
CO-2	Students will practice the cultivation of herbs and the development of drug products.	U, Ap	PSO-3
CO3-	The student will analyze herbal cosmetics, natural sweeteners, nutraceuticals, and other aspects related to herbal technology	An	PSO-4, 6
CO-4	Students will be able to perform preliminary phytochemical screening of crude drugs	An, Ap, E	PSO-7
CO-5	Student will understand the WHO and ICH guidelines for evaluation of herbal drugs.	R,U	PSO-8

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Herbal Technology

Credits: 3:0:1 (Lecture:Tutorial: 0 Practical:)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO-1	1	3	U	F, C	L	
CO-2	2	3	U, Ap	P	L	P
CO3-	3	4,6	An	M	L	P
CO-4	4	7	An, Ap, E	P	L	P
CO-5	5	8	R, U	F	L	

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4	✓			✓
CO 5	✓	✓		✓