University of Kerala

Discipline	**BOTANY**				
Course Code	**UK4VACBOT203**				
Course Title	**PHYTONUTRACEUTICALS**				
Type of Course	**VAC**				
Semester	**IV**				
Academic Level	**200-299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	03	03 Hours	-	-	03 Hours
Pre-requisites	No Pre-requisites				
Course Summary	The course is designed to address the rapidly growing field of nutraceuticals, covering a wide range of topics including their types, mechanisms of action, manufacturing processes, product development, clinical testing, and considerations regarding toxicity. The course will provide insight into additives crucial for enhancing shelf life, aiding processing, and improving sensory appeal within the processed food industry.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		**Introduction**	**09**
	1	Introduction to nutraceuticals: Phytochemicals, phytonutrients & Phyto remedies- definitions, basis of claims for a compound as a nutraceutical, regulatory issues for nutraceuticals including CODEX.	
	2	Plants as food and medicine.- microgreens, Single cell protein, millets, and antioxidants	
	3	Plants yielding nutraceuticals- Vegetables (Yams, carrot & tomato), Fruits (Apple, Banana, Orange & Papaya)	
	4	Medicinal plants (*Aloe vera*, *Hemidesmus indicus, Moringa oleifera, - Piper, Zingiber, Allium*)	
II		**Role of Nutraceuticals**	**09**
	5	Concept of angiogenesis and the role of nutraceuticals/functional foods	
	6	Nutraceuticals for cardiovascular diseases, cancer, diabetes, cholesterol management, obesity, joint pain, immune enhancement, age-related muscular degeneration, endurance performance, and mood disorders – compounds and their mechanisms of action, dosage levels, contraindications.	
III		**Manufacturing of Nutraceuticals**	**09**

	7	Manufacturing methods of selected nutraceuticals such as lycopene, isoflavonoids, prebiotics and probiotics, glucosamine, phytosterols, etc. (Brief description only)	
	8	Formulation of functional foods containing nutraceuticals – Stability and analytical issues, labelling issues.	
IV	**Clinical testing of Nutraceuticals**		**09**
	9	Clinical testing methods of nutraceuticals and health foods (Brief description only)	
	10	Interactions of prescription drugs and nutraceuticals.	
	11	Adverse effects and toxicity of nutraceuticals.	
	12	Nutrigenomics -an introduction and its relation to nutraceuticals.	
V	**Functional ingredients of Nutraceuticals**		**09**
	13	Proteins, starch, and lipids as functional ingredients;	
	14	Isolation, modification, specifications, functional properties	
	15	Applications of food as nutraceuticals.	

Suggested Readings

1. Branen AL, Davidson PM & Salminen S. 2001. Food Additives. 2nd Ed. Marcel Dekker.
2. Webb GP. 2006. Dietary Supplements and Functional Foods. Blackwell Publ.
3. Gibson GR & William CM. 2000. Functional Foods - Concept to Product.
4. Goldberg I. 1994. Functional Foods: Designer Foods, Pharma Foods
5. Morton ID & Macleod AJ .1990. Food Flavours. Part A, BC. Elsevier.

References

1. Brigelius-Flohé, J & Joost HG. 2006. Nutritional Genomics: Impact on Health and Disease. Wiley VCH.
2. Cupp J and Tracy TS. 2003. Dietary Supplements: Toxicology and Clinical Parmacology. Humana Press.
3. Losso JN. 2007. Angi-angiogenic Functional and Medicinal Foods. CRC Press.
4. Madhavi DL, Deshpande SS & Salunkhe DK. 1996. Food Antioxidants: Technological, Toxicological and Health Perspective. Marcel Dekker.
5. Neeser JR & German BJ. 2004. Bioprocesses and Biotechnology for Nutraceuticals. Chapman & Hall.
6. Robert EC. 2006. Handbook of Nutraceuticals and Functional Foods. 2nd Ed. Wildman.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	This course will equip students to explain phytonutraceuticals and their use in daily life	R	PSO-1
CO-2	Students can evaluate the dual role of plants as sources of food and medicine.	R, U	PSO-3
CO-3	Students will analyze the role of nutraceuticals in managing various health conditions, including	An, Ap	