

5.	Microrganisms in agriculture Beneficial microorganisms in Agriculture: Biofertilizer (Bacterial Cyanobacterial and Fungal), microbial insecticides, Biodegradable plastics, Plant– Microbe interactions.	10
	Total	45

Books: -

S.No.	Name of Books/ Author/Publisher
1	Industrial Microbiology: An Introduction by Michael J. Waites, Wiley-Blackwell (2009)
2	General microbiology by R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter. Publisher: Macmillan (1987)
3	Microbiology by Prescott Harley and Klein. Publisher: Mc Graw Hill (2007)
4	Microbiology by M.J. Pelczar, E.C.S. Chan and N.R. Kreig. Publisher: Tata McGraw Hill (2005)

NUTRACEUTICALS

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Nutraceuticals (BT420)	03	01	00	Nil

Course Objective:

This course will describe biochemistry, health benefits, development and regulation of nutraceuticals. It covers the scientific basis of nutraceuticals, their bioactive compounds, mechanisms of action, regulatory aspects, and their application in managing chronic diseases. The course also emphasizes the development, evaluation, and market potential of nutraceutical products.

Course Outcome (CO):

- 1 Define nutraceuticals and outline basis, properties, structure and functions. Classify them into different groups
- 2 Analyse nutraceuticals in diseases management especially for cancer, diabetes, cardiovascular and cholesterol management

- 3 Discuss development and manufacturing of nutraceuticals and also identifying analytical techniques in it
- 4 Outline interactions of prescription drugs and nutraceuticals and analyse adverse effects and toxicity of nutraceuticals
- 5 Explain nutrigenomics and its relation to nutraceutical, Scope of genetic engineering in nutraceutical production

S.No.	Content	Contact Hours
1.	Introduction: Definitions; Synonymous terms; Basis of claims for a compound as a nutraceutical; Properties, structure and functions of various nutraceuticals; Classification of nutraceuticals; Nutraceuticals of plant and animal origin; Microbial and algal nutraceuticals; Non-nutrient effects of specific nutrients; Antinutritional factors present in foods; Regulatory issues for nutraceuticals including CODEX	8
2.	Nutraceuticals and Disease Management: Concept of angiogenesis; Nutraceuticals for cardiovascular diseases, cancer, diabetes, cholesterol management, obesity, joint pain, immune enhancement, age-related macular degeneration	8
3.	Nutraceutical Development: Manufacturing of nutraceuticals (lycopene, isoflavonoids, prebiotics, probiotics, glucosamine, phytosterols); Formulation of functional foods containing nutraceuticals; Packaging and safety evaluation; Analytical techniques in nutraceutical industry	8
4.	Clinical Testing of Nutraceuticals: Interactions of prescription drugs and nutraceuticals; Adverse effects and toxicity of nutraceuticals	8
5.	Nutrigenomics: An introduction to nutrigenomics and its relation to nutraceuticals; Scope of genetic engineering in nutraceutical production; Production technology for recombinant therapeutic products using <i>E. coli</i> with examples like human insulin, growth hormones, interferons, erythropoietin; Biotechnology in phytonutraceuticals	10
Total		42

Books: -

S.No.	Name of Books/ Author/Publisher
1	Handbook of Nutraceuticals and Functional Foods by Robert E.C. 3 rd Ed. CRC Press
2	Dietary supplements and functional foods by Geoffrey P. Webb. 2 nd Ed. Wiley Blackwell Publishing
3	Anti-angiogenic functional and medicinal foods by Losso, JN. CRC Press