

**SARDAR PATEL UNIVERSITY  
VALLABH VIDYANAGAR**



**MASTER OF SCIENCE (Home Science)  
SYLLABUS EFFECTIVE FROM: 2018-19  
Semester: IV**

**PH04CFBT21 NUTRITIONAL BIOTECHNOLOGY**

**(100 MARKS -4 HOURS, CREDITS-4)**

**Objective:**

- Students will be able to understand how biotechnology can be utilized for improving the nutritional content of foods stuff.

**Content:**

**Unit: 1** Principles and methods of plant tissue culture, development of transgenic plants.

**Unit: 2** Enhancing the nutritional quality of foods- manipulation of sucrose and starch content: manipulation of fatty acid composition of oils, enriching with protein content, increasing the content of methionine and lysine in feed storage proteins increasing the levels of vitamins and minerals.

**Unit: 3** Removal or minimizing the antinutritional factors and toxic molecules from food- phytate, oxalic acids, neurotoxins etc., decreasing the contents of pesticides, herbicides and heavy metals-use of bioinsecticides, development of herbicide resistant plant etc.

**Unit: 4** Increasing the shelf life of the fruits

1. Development of food value metabolites-food colors, food flavours, food additives, sweeteners etc.
2. Animal biotechnology for increasing meat quality and meet production.

**Course learning outcome:**

- After studying the course students will be able to apply biotechnology for improving the nutritional quality of different plants and animal foods.

**Reference Books:**

1. Rutledge, Food and Nutritional Biotechnology, Navyug Publishers & distributors, 2009
2. Ravishankar Rai V, Advances in Food Biotechnology, Wiley-Blackwell, 2015

3. *Donald Bills and Shain-dow Kung*, Biotechnology and Nutrition Proceedings of the Third International Symposium, Butterworth-Heinemann, Boston

## **PH04CFBT22 FOOD BIOSCIENCES**

**(100 MARKS -4 HOURS, CREDITS-4)**

### **Objective:**

After completion of the course students will be able to

- Provide conceptual inputs regarding bio-processes in foods
- Get sensitized and motivated towards the application of biological and related sciences to food issues

### **Content:**

#### **Unit: 1**

Bioprocesses: Fermentation technology, Microorganisms in food fermentations, Bacteriocins and antimicrobial ingredients, Nutrients and nutraceutical production. Germination- basic process and use for nutrients and nutraceutical production.

#### **Unit: 2**

- (a) Immobilization- Basics and applications in food processing  
(b) Microencapsulation- Basics and applications in food processing

#### **Unit: 3**

- (a) Enzymes in food processing: fermentative production of enzymes (amylases, proteases, cellulases, pectinases, xylanases, lipases) used in food industry and their downstream processing. Enzymes for production of protein hydrolysates and bioactive peptides, maltodextrins and corn syrup solids (liquefaction, saccharification, dextrinization, isomerization for production of high-fructose-corn-syrup), fructose and fructo-oligosaccharides.
- (b) Enzymes as processing aids: Role of enzymes in cheese making and whey processing; fruit juices (cell wall degrading enzymes for liquefaction, clarification, peeling, debittering, decolourization of very dark coloured juices such as anthocyanases); baking (fungal  $\alpha$ -amylase for bread making; maltogenic  $\alpha$ -amylases for anti-staling; xylanases and pentosanases as dough conditioners; lipases for dough conditioning.

**Unit: 4** Bioinformatics- Basics and application in food science

**Unit: 5** Molecular techniques in the detection of food pathogens and GM foods

### **Course learning outcome:**

Students will learn about:

- Use of bioprocesses for increasing the functionality and nutraceutical properties of foods
- Use of techniques for immobilization and encapsulation processes.
- Production and use of enzymes in food processing

### **Reference Books:**

1. Flickinger MC & Drew SW. 1999. *Encyclopedia of Bioprocess Technology*. A Wiley-Inter Science Publ.

2. Kruger JE. *et al.* 1987. *Enzymes and their Role in Cereal Technology*. American Association of Cereal Chemists Inc.
3. Nagodawithana T & Reed G. 1993. *Enzymes in Food Processing*. Academic Press.
4. Tucker GA & Woods LFJ. 1991. *Enzymes in Food Processing*. Whitehurst R & Law B. 2002. *Enzymes in Food Technology*. Blackwell Publ.
5. Kalidas Shetty, Gopinath Paliyath, Anthony Pometto and Robert E, Levin, *Food Biotechnology*-Second Edition, CRC Press, 2005.
6. Journal of Food Biosciences, [www.journals.elsevier.com/food-bioscience](http://www.journals.elsevier.com/food-bioscience)
7. Debasis Bagchi, Francis C. Lau and Manashi Bagchi, *Application of Genomics and Bioinformatics Analysis in Exploratory Study of Functional Food*, Wiley-Blackwell, Oxford, UK. doi: 10.1002/9780813821474.ch6

### **PH04CFBT23 DISSERTATION & VIVA VOCE**

**(350 MARKS - 21 HOURS, CREDITS -14)**

#### **Objective:**

- To provide students with the opportunity to work independently as researchers
- To make students better researchers

#### **Content:**

1. The student will continue the research work taken up in the III semester and will complete it by the end of the semester
2. The student has to submit hard and soft copy of the report in the required format at the end of the semester
3. The student has to face a external viva voce on the research work carried out by the student

#### **Course Learning Outcome:**

- The student would have gained in-depth knowledge in the area of work
- The student would have learnt the intricate details for research and report writing

### **PH04CFBT24 SEMINAR**

**(50 MARKS - 4 HOURS, CREDITS -2)**

Students will select a topic of their choice, collect related recent review of literature and make a presentation.

### **PH04CFBT25 COMPREHENSIVE VIVA VOCE**

**(25 MARKS - 2 HOURS, CREDITS -1)**

At the end of the semester students will appear for a viva voce based on course content covered in all the theory and practicals of all four semesters.

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