

20FT001 - Food Microbiology

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L	T	P
45	15	-

WA/RA	SSH/HSB	CS	SA	S	BS
15	30	-	5	5	-

Course Description and Objectives:

This course aims to provide instruction in the general principles of food microbiology. The course covers the biology and epidemiology of foodborne microorganisms of public health significance, including bacteria, yeasts, fungi, protozoa and viruses, and food spoilage microorganisms; the microbiology of food preservation and food commodities; fermented and microbial foods; principles and methods for the microbiological examination of foods; microbiological quality control, and quality schemes.

Course Outcomes:

Upon successful completion of this course student should be able to:

- Explain the interactions between microorganisms and the food environment, and factors influencing their growth and survival.
- Explain the significance and activities of microorganisms in food.
- Describe the characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification.

SKILLS:

- Prepare and sterilize media.
- Identify types of microorganisms present in food products.
- Prepare pure cultures of microbes.
- Isolate microorganisms from the food sample

Activity

Prepare flow charts for production of food products using different microorganisms.

UNIT - I

History of Food Microbiology, Relevant microbial groups, Microbes found in raw materials and foods that are detrimental to quality, Factors that influence the development of microbes in food.

UNIT - II

Food borne pathogens and their public health impact (Bacteria, Viruses, Parasites, Prions), Trends in food borne diseases and implications, Methods of disease transmission, Emerging food-borne pathogens (*E. coli* O157:H7, *Listeria monocytogenes*, *Salmonella enterica*,

Campylobacter, *Yersinia enterocolitica*) Newer and rapid methods for qualitative and quantitative assay demonstrating the presence and characterization of microbes

UNIT - III

Microbial growth in food: intrinsic, extrinsic and implicit factors, Microbial interactions, Effects of enzymes and other proteins, Inorganic, organic and antibiotic additives adaptation phenomena and stress phenomena, Effect of injury on growth or survival.

UNIT - IV

Microbial spoilage: types and control measures; Food preservation, Combination systems. Microbial behavior against the newer methods of food processing, Adoption and resistance development, Microbes as test organisms, hygiene indicators and assensors.

UNIT - V

Microbial food fermentations, Pre and probiotics cultures: Successful characteristics, development of commercial symbiotic products; Effects of enzymes and other proteins.

Food Microbiology Lab

1. Introduction to basic microbiology, laboratory practices, sterilization, media preparation
2. Culturing and sub-culturing of microorganism
3. Staining and microscopic examination of bacteria, yeast and molds
4. Evaluation of microorganism in raw and processed products by standard plate count/TPC and TYC
5. Detection of coliforms by MPN method, confirmed and completed tests
6. Study of factors influencing growth of Microorganisms-Effect of pH/Temperature/oxygen
7. Determination of effects of antibiotics on the suppression of microbial growth
8. Detection of effects of various preservatives on the suppression of microbial growth
9. Development of probiotics in the laboratory
10. Detection of common dairy pathogen dairy/ meat products (*E.Coli/B. Cerus/Salmonella/Listeria*) by rapid detection techniques

TEXT BOOKS:

1. Adams M. 2006. Emerging Food-borne Pathogens. Woodhead Publ.
2. Adams MR & Moss MO. 2000. Food Microbiology. Panima.
3. Easter MC. 2003. Rapid Microbiological Methods in the Pharmaceutical Industry.
4. Harrigan W. 2003. Laboratory Methods in Food Microbiology. University of Reading, UK, Elsevier.

REFERENCE BOOKS:

1. James MJ, Loessner MJ & David A. 2005. Modern Food Microbiology. 7th Ed. Golden Food Science Text Series.
2. Pederson CS. 1979. Microbiology of Food Fermentations. AVI Publ.
3. Roberts R. 2002. Practical Food Microbiology. Blackwell Publ.
4. Rossmore HW. 1995. Handbook of Biocide and Preservative. Blackie
5. Wood JBB. 1999. Microbiology of Fermented Foods. Vols. I, II. Blackwell Academic.
6. Yousef AE. 2002. Food Microbiology: A Laboratory Manual. AVI.