Department of Food Sciences
University of the Punjab, Lahore
Course Outline

Program	B.Sc. (Hons.) Food Science & Technology	Course Code	FST-306	Credit Hours	3(2-1)
Course Title	**FOOD MICROBIOLOGY**				

Course Introduction

The course will provide:
1. Basic knowledge of the microbiology of food preservation and food commodities
2. Basic knowledge of principles and methods for microbial examination of food
3. Understanding of food-borne microorganisms of public health significance

Learning Outcomes

After completing this course students will be able to:
1. Identify different types of microorganisms on the basis of morphological and physiological characteristics.
2. Grasp knowledge about microbial contamination of foods and factors affecting microbial growth
3. Understand about food borne infections and food intoxications.

	Course Content	Assignments/Readings
Week 1	**Unit-I** 1.1 Overview of Food Microbiology	
	1.2 Microorganisms in Food: Beneficial and Harmful	
Week 2	**Unit-II** 2.1 Factors Affecting Microbial Growth in Food	
	2.2 Bacteria in Food: Pathogenic and Spoilage	
Week 3	**Unit-III** 3.1 Viruses and Foodborne Diseases	
	3.2 Parasites and Protozoa in Food	
Week 4	**Unit-IV** 4.1 Heat Processing: Pasteurization and Sterilization	
	4.2 Refrigeration and freezing	
Week 5	**Unit-V**	

	5.1 Drying and Dehydration	
	5.2 Fermented Foods and Beverages	
Week 6	**Unit-VI** 6.1 Microbial Spoilage and Food Quality	
	6.2 Foodborne Toxins and Mycotoxins	
Week 7	**Unit-VII** 7.1 Food Spoilage: Causes and Prevention	
	7.2 Quality Assurance in Food Industry	
Week 8	**Unit-VIII** 8.1 Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Point (HACCP)	
	8.2 Foodborne Outbreaks and Epidemiology	
Week 9	**Unit-IX** 9.1 Genetically Modified Organisms (GMOs) in Food	
	9.2 Nanotechnology in Food Safety	
Week 10	**Unit-X** 10.1 International and National Food Regulations	
	10.2 Compliance with Food Safety Standards	
Week 11	**Unit-XI** 11.1 Food Labeling and Consumer Protection	
	11.2 Case Studies in Food Microbiology	
Week 12	**Unit-XII** 12.1 Research Trends in Food Microbiology	
	12.2 Course Review and Exam Preparation	
Week 13	**Unit-XIII** 13.1 Food Preservation Methods: Overview	
	13.2 Fermentation: Principles and Applications	
Week 14	**Unit-XIV** 14.1 Emerging Issues in Food Microbiology	

	14.2 Food Microbiology and Quality Control: Overview	
Week 15	**Unit-XV** 15.1 Food Regulations and Compliance: Overview	
	15.2 Food Safety in Processing and Handling	
Week 16	**Unit-XVI** 16.1 Advances in Food Safety Testing	
	16.2 Advances in Food Safety Testing	
PRACTICAL		
Week 1	Laboratory Safety and Introduction to Microscopy	
Week 2	Isolation and Identification of Foodborne Pathogens	
Week 3	Heat Processing Techniques	
Week 4	Detection of Toxins in Food	
Week 5	Quality Control Testing in Food	
Week 6	Emerging Technologies in Food Microbiology	
Week 7	Regulatory Compliance in the Food Industry	
Week 8	Final Project and Review	
Week 9	Microscopic Examination of Food Microorganisms	
Week 10	Techniques in Fermentation	
Week 11	Quality Assurance Practices	
Week 12	HACCP Implementation Exercise	
Week 13	Outbreak Investigation Simulation	
Week 14	GMO Detection Methods	
Week 15	Compliance Audits in the Food Industry	
Week 16	Gram Staining	

Textbooks and Reading Material

1. Michael, P., Doyle, F.D.G. & Colin, H. (2019). Food Microbiology: Fundamentals and Frontiers. (5th ed.). Wiley and Sons, USA.
2. Frazier, W.C. & Westhoff, D.C. (2008). Food Microbiology. McGraw Hill Book Co., New York, USA.

3. Adams, M.R. & Moss, M.O. (2006). Food Microbiology. The Royal Society of Chemistry, Cambridge, UK.

4. Yousef, A.E. & Carlstrom, C. (2003). Food microbiology: A Laboratory Manual. John Wiley & Sons, New Jersey, USA.

5. Brown, M. & Stringer, M. (2002). Microbiological Risk Assessment in Food Processing. Woodhead Publishing Ltd. Cambridge, UK.

6. Spencer, J.F.T. & Ragout, Spencer, A.L. (2001). Food Microbiology Protocols. Humana Press, New Jersey, USA.

Teaching Learning Strategies

Lectures and Multimedia Presentations: Deliver structured lectures covering fundamental concepts of food microbiology, including the role of microorganisms in food production, spoilage, and safety. Use multimedia presentations, videos, and animations to enhance understanding of complex microbial processes.

Laboratory Practical and Demonstrations: Conduct Handson laboratory sessions where students can perform experiments such as microbial culturing, identification, and testing of food samples. Demonstrations of techniques like PCR and microbial enumeration help students gain practical skills and experience.

Case Studies and Real-world Applications: Use case studies and examples from the food industry to illustrate the impact of microbes on food quality and safety. Discuss real world issues such as foodborne outbreaks and spoilage, emphasizing the importance of microbiological testing and control measures.

Group Discussions and Problem-solving Activities: Facilitate group discussions on current topics in food microbiology, encouraging students to analyze and debate issues like antibiotic resistance, food preservation methods, and the use of probiotics. Problem solving activities can involve scenarios that require students to develop strategies for managing microbial risks in food processing.

Guest Speakers and Industry Visits: Invite professionals from the food industry, regulatory agencies, or research institutions to give guest lectures on topics such as food safety regulations, microbial biotechnology, and innovations in food microbiology. Arrange visits to food production facilities or laboratories to provide students with practical insights into the field.

Research Projects and Presentations: Assign research projects where students investigate specific topics within food microbiology, culminating in written reports and oral presentations. This allows students to explore areas of interest in depth and practice communicating scientific information effectively.

Assignments: Types and Number with Calendar

1. Review article / Presentation (10 marks)
2. Written Assignment (5 Marks)
3. Quizzes (5 Marks)
4. Class Participation and attendance (5 marks)

Assessment

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.