



Course Descriptor FSHNF313 FOOD MICROBIOLOGY

ACADEMIC YEAR	2020 / 2021		
Course Code & Title	FSHNF313 FOOD MICROBIOLOGY		
Credit hours	3	Level of study	DIPLOMA/BSc
College / Centre	College of Health and Applied Sciences		
Co-requisites	Biol 281 Microbiology LAB	Pre-requisites	BIOL201 Microbiology

1. COURSE OUTLINE

[Food is necessary for human survival and it's shelf-life plays an enormous role in the global economy and sustenance. Although, microbes play an essential role in food preservation since time immemorial and more recently in food biotechnology, however, their unwanted propagation and presence in food poses an acute & chronic risk to human health with both imperative aspects need to be considered as food degradation reactions continues in presence of microorganisms. Food Microbiology is a major course in Food Science & Human Nutrition undergraduate curriculum at ASU and has been designed to give students an understanding of the role of microorganisms in food processing and preservation; the relationship of microorganisms to food safety, food spoilage, food-borne illness, i.e., food infections or food intoxication, extrinsic & intrinsic factors related to food and its quality, along with food fermentation; food biotechnology; hygienic production of food; the impact of molecular mechanisms of infectious microbes and their role in human health.

Food Microbiology course is designed for undergraduate students in Food Science & Human Nutrition (FSHN) with pre-requisite understanding of Basic Biology & Fundamentals of Microbiology.]

2. AIMS

[This course is designed to help students learn the basic principles of food microbiology, to solve problems in food production till safe delivery to human, and to report clearly and concisely their knowledge in both in oral and written format

To understand the role of microorganisms in food processing, preservation and food safety, and the possible health benefits from the consumption of health-promoting microorganisms or products derived from their fermentation.

- To understand the growth factors, extrinsic & intrinsic components, and predict microorganisms, which can cause food spoilage upon exposure to conducive environment;
- To understand the causes of food-borne illness or diseases, causative microbial agents, disease etiology, prevention of microbial growth and techniques that can control such factors.
- To evaluate the measures required to control undesired microorganisms in food.]

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes (Definitive)	Teaching and Learning methods (Indicative)	Assessment (Indicative)
Upon successful completion of this course, students will be able to:		
1. To understand the basic concepts of microbiology, with focus on classification of microbes found in foods, i.e., bacteria, fungi,	Class lectures, Power point presentations.	Take-home assignment; quiz 1/mid-term test -1/ Final exam



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	molds, virus, etc; and revisit the history of microbiology		
2.	To understand the role of microbiology in food sciences esp.in food spoilage, degradation & its human cost and control	Lecture, power point presentations with pictorial method of sample collection, Exercise	quiz 1/mid- term test -1/ Final exam
3.	To attain knowledge about microbial growth factors, intrinsic & extrinsic factors & components. Nutritional requirements of microbes, their metabolism and waste generation	Class lectures, power point presentations, Take-home exercise of data.	Written Examination - mid-term test 1/Final exam
4.	To use the knowledge about food composition; properties of foods that support growth of microorganisms, i.e., water in foods (free and bound water), water activity and microbial growth.	Lecture, power point presentations, Take-home assignment, complimentary Lab. Sessions	Written Examination- mid-term test 1/ Final exam
5.	To become aware of different types of Food-borne Illnesses/diseases, their causative agents, distinction between food intoxication & food infections.	Class lectures, power point presentations, discussions, problem based learning through complimentary lab. Sessions	Mid- term 1 / Quiz 2/ Final exam
6.	To understand the re-emergence of disease caused by microorganism, inter-continental transfer of microorganism though food and illnesses among various geographies	Class lectures, power point presentations, discussions, problem based learning through food sample preparation in lab. Sessions.	Quiz 2/ Mid-tem 2/ Final exam
7.	To gain hands-on experience on microbial techniques for identification, separation, isolation and characterization of microbes from food.	Class lectures, power point presentations, discussions, problem based learning & Demonstration in Laboratory sessions.	Mid-tem 2/ Final exam
8.	To extend their experience in using various techniques in microbiological testing, i.e., aflatoxins,	Class lectures, power point presentations, discussions, Demonstration in complimentary laboratory sessions.	Final exam



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mycotoxins, seafood toxins, etc		
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4. ASSESSMENT WEIGHTING

Assessment	Percentage of final mark (%)
Midterm Exam - I	15%
Quiz 1	5%
Quiz 2	5%
Assignments	10%
Final Examination	35%
Lab	30%
TOTAL	100%

5. ACHIEVING A PASS

Students will achieve 3 credit hours for this course by passing **ALL** of the course assessments [*alternatively, list the compulsory pass assessments **] and achieving a **minimum overall score of 50%**

NB *Ensure that ALL learning outcomes are taken into account

6. COURSE CONTENT (Indicative)

LECTURE TOPIC	TIME (HOURS)
1- Basic principles of Microbiology Food Microbiology. - History of Food Microbiology. - Classification of Food-Associated Microorganisms. - Determination of Microorganisms in Food.	2
2.- Factors Affecting Microbial Growth. - Microorganisms Involved in Fermentation: Dairy. - Microorganisms Involved in Fermentation: Meat and Vegetables	2
3- Food Spoilage Microorganisms. Introduction into Food-borne Pathogens. Gram-Positive and Gram-Negative Organisms, Infections, Toxins and Non-living forms	2
4- Food-borne illness: Causative agents of food borne illnesses - Food-borne illness: Infections - Salmonella, Shigella and Campylobacter. - Food-borne illness: Infections - Escherichia coli and Listeria monocytogenes. - Food-borne illness: Infections – Infections caused by non-living forms, virus & prions	2
5- Food-borne illness: Causative agents & Intoxications - Food-borne illness: Intoxications: Staphylococcus aureus, Clostridium botulinum, Bacillus cereus. - Food-borne illness: Intoxications - Molds and Mycotoxins and Seafood Toxins.	2
Midterm Exam	



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Methods of Controlling Food Spoilage - Preservation with Low & High Temperature - Radiation & chemical preservation	2
Control of Microorganisms in Food - High and Low Temperature. Death Kinetics. - Low Water Activity and Preservation by Drying.	2
Control of Microorganisms in Food - Food Sanitation - Physical Removal and Sanitation.	2
Food Safety & Toxicology - Mycology & Mycotoxins - Aflatoxins & Fungal Growth - Other Toxins of Importance	2
Emerging Food-borne Pathogens - Re-emergence of Traditional pathogens - Water-borne pathogens	2
Physical Methods of Food Preservation: - Radiation and Modified Atmosphere (CA).	2
Chemical Preservatives. - Food Preservatives of Natural Origin - Bacteriocins and Bacteriophages. - Use of anti-microbial Drugs & Safety	2
Food Biotechnology - Genetically-Modified Foods - Reality and Concerns. - Advances in Industrial Food Biotechnology	2
Food Safety Management Tools: - HACCP, SSOP, GMP, GHP, TQM and ISO-9000 Standards. - Quality Assurance & Quality Control (QA/QC)	2
Revision of Course Material	
FINAL EXAM week	
RECOMMENDED STUDY HOURS 1 - 15	30
TOTAL HOURS	60
Plus RECOMMENDED INDEPENDENT STUDY HOURS	



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TOTAL COURSE HOURS	
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7. RECOMMENDED READING

Core text/s:

Textbook:

- *Food microbiology : fundamentals and frontiers / editors, Michael P. Doyle and Larry R. Beuchat. -3rd ed. 2007.*
- *Food Microbiology: An Introduction.* Montville, T.J. and K.R. Matthews (2nd edition) ASM Press, Washington, DC.
- *Food Microbiology* Martin R Adams, Maurice O Moss. 3rd Edition. 2008
- *Food Microbiology; A Laboratory Manual.* By Yousef, A. E., & Carlstrom, C., Wiley Interscience, John Wiley Inc. Hoboken, NJ, USA, 2003
- Lecture Notes & Presentation material will be provided by the Instructor.

Reference:

- *Modern Food Microbiology.* Jay, J.M. 7th Edition. Aspen Publishers, Inc., Gaithersburg, Maryland, 2005. (in Library as Reference)
- *Fundamental Food Microbiology.* Ray, B. & A. Bhunia, 4th Edition. CRC Press 2008. (in ASU Library)
- *Practical Food Microbiology.* Diane Roberts Melody Greenwood. 3rd Edition. Blackwell Science Ltd. 2003.