University of Arkansas – Fort Smith
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General Syllabus

BIOL 4223 Food Microbiology

Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 0

Prerequisite: BIOL 2503/2501 General Microbiology/Laboratory

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

The role of microorganisms in the preservation, spoilage, poisoning of food products, and their role in the manufacture of products of agricultural origin.

II. Student Learning Outcomes

A. Subject Matter

Upon completion of this course, the students will be able to :

1. Evaluate the historical basis of food microbiology.
2. Compare and contrast cultural similarities and diversity of in food microbiology.
3. Analyze the habitats, taxonomy, and growth parameters of microorganisms of importance to the food industry.
4. Evaluate the intrinsic and extrinsic parameters of foods that affect microbial growth.
5. Identify microorganisms associated with fresh meats and poultry.
6. Develop microorganisms associated with processed meats and poultry.
7. Organize microorganisms associated with seafood.
8. Inspect microorganisms associated with fermentation and fermented dairy products.
9. Categorize microorganisms associated with fresh and fermented fruit and vegetable products.
10. Develop culturing, identifying, and sampling of food associated microorganisms.
11. Examine of food preservation strategies.
12. Design a HACCP plan.

B. University Learning Outcomes:

Food Microbiology enhances student abilities in the following areas:

Communication Skills (written and oral)

Students will appropriately communicate factual information and reasoning in a written form via essay exam questions and written analysis of primary literature. Students will communicate factual information and reasoning verbally in a socially appropriate manner by interacting with classmates in small group settings when discussing literature.

Analytical Skills
Critical Thinking Skills: Students will critically evaluate scientific papers obtained from primary sources.

III Major Course Topics

A. Culture and History of Food Microbiology
   1. Famous foodborne diseases of history
   2. Historical figures and discoveries in food science
B. Taxonomy, Role, and Significance of Microorganisms in Foods
   1. Bacteria infections and toxins in foods
   2. Viral foodborne illnesses
   3. Parasites transmitted by food
C. Intrinsic and Extrinsic Parameters of Foods that Affect Microbial Growth
   1. Nutrients in foods that promote microbial growth
   2. Storage temperatures and conditions that can promote microbial growth
D. Microorganisms in Food
   1. Common bacterial foodborne pathogens
   2. Common viral foodborne pathogens
   3. Common eukaryotic parasites found in food
E. Culturing, Microscopic, and Sampling Methods
   1. Common selective and differential media used to detect foodborne pathogens
   2. Microscopic staining techniques used in the food industry
   3. Methods of sampling and specimen handling procedures for foods
F. Physical, Chemical, Molecular, and Immunological Methods
   1. Physical examination of foods for contamination
   2. Chemical and molecular tests used to detect foodborne pathogens or toxins
   3. Immunological assays used to screen for foodborne pathogens
G. Bioassays
   1. serological tests used to identify foodborne pathogens
   2. DNA probes used to identify serious pathogens found in foods
H. Food Preservation with Chemicals
   1. Classification of food preservatives
   2. Modes of action of commonly used preservatives
I. Radiation Preservation of Foods and Nature of Microbial Radiation Resistance
   1. Mechanisms for using ultraviolet radiation in foods
   2. Safety and risk assessment for radiation use
   3. Mode of action for radiation against microbes
J. Low Temperature Food Preservation and Characterization of Psychrotrophic Microorganisms
   1. Refrigeration of foods

2. Classification of phsychrotrophic spoilage organisms
3. Freezing of foods
4. Free-drying of foods

K. Preservation of Foods by Drying
1. Traditional dehydration of foods
2. Examination of dehydrators
3. Characteristics of foods that can be dehydrated

L. Indicators of Food Microbial Quality
1. QA/QC methods used in the food industry
2. USDA and FDA regulations on foods
3. Protocol for issuing recalls on food products

M. HACCP System and Food Safety
1. Definition of the HACCP system
2. Step by step protocol for following the HACCP system
3. Food safety techniques and education