

HARTNELL COLLEGE

COURSE OUTLINE

CC Approval: 05/21/2009
Board of Trustees: 07/07/2009
Last Revised:

DESIGNATOR & NUMBER: ABT 135

COURSE TITLE: Introduction to Food Microbiology

CREDIT UNITS: 1.5

FACULTY INITIATOR: Larry Adams

SEMESTER HOURS:

16.00 - 18.00	Lecture Contact Hours
24.00 - 27.00	Lab Contact Hours
0.00	Total Contact Hours
0.00	Total Out-of-Class Hours
0.00	Total Student Learning Hours

TOTAL CONTACT HOURS (BASED ON 16-18 WEEKS)

16.00 - 18.00	Lecture
24.00 - 27.00	Lab
0.00	By Arrangement Lab Hours (DHR)

GRADING BASIS:

Grade Only

PREREQUISITE:

COREQUISITE:

ADVISORY:

Introductory course in biology.

OTHER:

COURSE DESCRIPTION:

An introduction to the principles of food microbiology and food safety. Investigation of the beneficial and harmful effects of microorganisms on food. Survey of the types of microbes found in various types of food, as well as methods for their detection. Evaluation of methods of microbial

control and mechanisms of disease of important food microorganisms, as well as sources of food contamination. Examination of implementation and effectiveness of food safety programs. Field trips may be required.

COURSE OBJECTIVES:

Upon satisfactory completion of the course, students will be able to

1. review the classification of microbes.
2. distinguish between controlled (fermentation) and uncontrolled (spoilage) biochemical processes.
3. assess the factors that affect microbial growth.
4. examine the prevalence of microorganisms in different types of foods.
5. compare and contrast mechanisms for measuring microbial growth in foods.
6. evaluate methods for controlling microbial growth in foods.
7. analyze mechanisms and symptoms of food borne intoxication and food borne infection.
8. evaluate protective measures and programs designed to improve food safety.

COURSE CONTENT:

- I. Types and characteristics of microbes
 - A. Bacteria
 - B. Fungi
 - C. Viruses
 - D. Protozoans
 - E. Helminths
 - F. Prions
 - G. Viroids
- II. Metabolic properties of microbes
 - A. Fermentation
 - B. Spoilage
 - C. Contamination without perceptible change
- III. Factors that influence microbial growth
 - A. Intrinsic parameters
 1. Moisture
 2. Acidity – alkalinity (pH)
 3. Oxidation – reduction potential
 4. Nutrient content
 5. Antimicrobial constituents
 6. Biological structures
 - B. Extrinsic parameters
 1. Storage temperature
 2. Relative humidity
 3. Presence and concentration of gases in the environment
 4. Presence and activity of other microorganisms
- IV. Microbial activity in food and beverage production
 - A. Dairy products
 - B. Pickled products
 - C. Fermented meat products
 - D. Bread
 - E. Alcoholic fermentation
 - F. Contribution of molds to food quality

- V. Overview of intrinsic microorganisms in foods
 - A. Fresh meats and poultry
 - B. Processed meats and seafood
 - C. Vegetable and fruit products
 - D. Other foods
- VI. Measuring microbial presence or activity in foods
 - A. Culture and sampling methods
 - B. Biochemical identification
 - C. Molecular identification
 - D. Serological identification
 - E. Quantitative assays
 - F. Bioassays
- VII. Controlling microbial growth in foods
 - A. Preservation methods
 - 1. Heat
 - 2. Cold storage
 - 3. Drying
 - 4. pH change
 - 5. Preservatives
 - 6. Modified atmospheres
 - 7. Irradiation
 - B. Microbial control in water supply, food preparation areas, and other practices
- VIII. Food transmitted pathogens
 - A. Bacterial
 - 1. Salmonella
 - 2. E. coli O157H7
 - 3. Listeria
 - 4. “Emerging” and other bacterial pathogens
 - B. Viruses
 - C. Protozoans
 - D. Helminths
 - E. Other
- IX. Control of food safety
 - A. Indicator organisms
 - B. Systems for assessing food safety
 - 1. HACCP
 - 2. FSO
 - 3. Other criteria

LAB CONTENT:

- I. Evaluation of safe food handling practices
 - A. Hand washing
 - B. Equipment cleanliness
 - C. Sampling techniques
- II. Measurement and transfer
- III. Light microscopy and morphological staining
- IV. Pure culture technique
- V. Isolation from and characterization of microbes in foods
- VI. Effect of environmental factors on microbial growth
- VII. Control of microbial growth: disinfection, sterilization, antibiotics
- VIII. Assessment of contamination of food, water, and utensils
- IX. Metabolic properties of microbes

- A. In food production
- B. In food spoilage

INSTRUCTIONAL METHODOLOGY:

- Lecture
 - Lab Activity
 - Individual Assistance
 - Audiovisual (including PowerPoint or other multimedia)
 - Demonstration
 - Discussion
 - Group Activity
- Requires a minimum of three (3) hours of work per unit including class time and homework.

METHODS OF EVALUATING OBJECTIVES OR OUTCOMES:

Methods of evaluation to determine if students have met objectives may include, but are not limited to the following:

CLASSROOM	EXPLANATION
Class Activity	Reading assignments and completion of written questions, class participation.
Lab Activity	Laboratory experiments, reports and field notes.
Written Assignments	Weekly written assignments outside of class time, exams, lab reports and quizzes.

EXAMS	EXPLANATION
Essay	Midterm and final exams
Comprehensive Final	Short written answer and objective questions.
Problem Solving	Written homework assignments where students will research a problem and propose alternate solutions. Distinguish between food spoilage and fermentation.
Skill Demonstration	Completion of laboratory exercises
Objective Test	Midterm and final
Quizzes	Weekly

MINIMUM STUDENT MATERIALS:

Textbook(s) similar to:

Loessner, J. M. *Modern Food Microbiology*. 7th Ed, Springer, 2006

COURSE ASSIGNMENTS

Examples of Reading Assignments

Course textbook, on line articles and materials.

Examples of Writing Assignments

Written homework assignments, laboratory reports, tests and quizzes.

Examples of Outside Assignments

Questions of weekly reading assignments, research assignments from on line sources. Laboratory

assignments and reports.

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