Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2018

Type of Action:

X	New
__	Modification
__	Move to Inactive (Stop Out)
__	Cancellation

Course Alpha and Number: BI117

Course Title: Food Science

Reason for initiating, revising, or canceling:
This course is being initiated as part of the USDA National Institute of Food and Agriculture (NIFA) Distant Education Grants for Insular Areas. This will be the first online course that includes a lab at NMC.

Denise J. Myers — 4/12/18
Proposer — Date

Velma C. Deleon-Guerrero — 4/12/2018
Department Chair — Date

Adam Walsh — APR. 12, 2018
Language & Format Review Specialist — Date

Ajani Burrell — 4/12/18
Academic Council Chair — Date

Amanda Angel-Diaz — 4/12/18
Acting Dean of Learning & Support Services — Date

1. **Department**
   Science, Math, Health and Athletics

2. **Purpose**
   This course is designed to introduce students to Food Science through the scientific process. Food Science emphasizes the importance of being a knowledgeable, safe consumer and at-home producer of food. Food Science expose students to a broad range of issues and information relating to the various aspects of many different foods. Topics of exploration include, but not limited to: food sustainability, chemistry of food, quality of food, food deterioration, methods of food preservation, environmental concerns, food safety, world food needs and properties, harvesting, and food processing.

3. **Description**

   A. **Required/Recommended Textbook(s) and Related Materials**
   Required:
   Parker, R., & Pace, M. (2017). *Introduction to food science & food systems* (2nd ed.). Boston, MA: Cengage Learning.

   Readability Level: Grade 13

   Recommended: N/A

   B. **Contact Hours**
   1. **Lecture:** 3 per week / 45 per semester
   2. **Lab:** 3 hours per week / 45 hours per semester
   3. **Other:** N/A

   C. **Credits**
   1. **Number:** 4
   2. **Type:** Regular degree credits

   D. **Catalogue Course Description**
   This course introduces food science and systems. The course will examine a variety of food via looking at aspects of sustainability, chemistry, composition, harvesting, processing, and preservation techniques. The course provides information to become more informed consumers and safer food handlers. This course will not supplement as the biology lab requirement for the Nursing degree program. This course will not transfer to other colleges as a general education biology course. Offered: Fall and Spring. Prerequisites: HE150. English Placement Level: EN 095. Math Placement Level: None.

E. Degree or Certificate Requirements Met by Course
A passing grade of a "C" or higher in this course fulfills NMC's General Education requirement for biological science classes with a lab and the Elective course requirement

F. Course Activities and Design
This course is being taught using a Distance Learning Format (online only). Each student will be required to access the Internet to participate in this class. There will be a variety of learning activities provided each week (chapter readings, videos, assignments, discussion forums, tests, labs etc.). Students are responsible for keeping up with the assignments on a weekly basis and adhering to the designated due dates. As this course is offered in a distance learning format, students can complete readings, assignments, and labs at any time during the week; however, all work must be completed by the designated due date. Managing time is each students' responsibility. Assignment due dates are outlined through Moodle, the online class site, as well as MindTap (the book companion site). Projects, labs, group interaction, and research are all designed to stimulate discussion, learning, and provide skills applicable to those who may continue on in the sciences as well as to make educated consumer choices.

4. Course Prerequisite(s); Concurrent Course Enrollment
Prerequisites: HE150 or higher
Concurrent Course Enrollment: None

Required English/Mathematics Proficiency Level(s)
English Placement Level: EN095
Mathematics Placement Level: MA091

5. Estimated Cost of Course; Instructional Resources Needed
Cost to the Student: Tuition for a 4-credit hour course, cost of the textbook, laboratory fee, and research activities expenses.

Cost to the College: Instructor's salary

Instructional resources needed for this course include library books, various laboratory materials, laboratory materials (chemicals, equipment, and consumable foods)

6. Method of Evaluation
Student's grades will be based on assignments, forum discussions, tests, laboratory experiments, and reports. NMC's grading and attendance policies will be followed.

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7. Course Outline

This is a topical outline and does not necessarily indicate the sequence in which the material will be presented.

1.0 Overview of Food Science
- 1.1 Parts of the food industry
- 1.2. Trends in the food industry
- 1.3 Responsiveness to change

2.0 Food Systems and Sustainability
- 2.1 What is a food system?
- 2.2 What is sustainability?
- 2.3 13 standards of sustainable food

3.0 Chemistry of Foods
- 3.1 Chemistry of carbohydrates
- 3.2 Chemistry of proteins
- 3.3 Chemistry of lipids
- 3.4 Chemistry of vitamins
- 3.5 Chemistry of minerals

4.0 Food Composition
- 4.1 Determining the composition of foods
- 4.2 Energy in food

5.0 Quality Factors in Food
- 5.1 Sensory evaluation
- 5.2 Quality standards
- 5.3 Quality controls

6.0 Unit Operations in Food Processing
- 6.1 Materials handling
- 6.2 Cleaning
- 6.3 Sorting
- 6.4 Processing

7.0 Food Deterioration
- 7.1 Types of food deterioration
- 7.2 Shelf life
- 7.3 Causes of food deterioration
- 7.4 Post harvest biochemical changes

8.0 Heat Preservation
- 8.1 Degrees of preservation
- 8.2 Heat resistant microorganisms
- 8.3 Heat transfer
- 8.4 Home canning

9.0 Cold Preservation
- 9.1 Refrigeration versus freezing
- 9.2 Chemical changes of cooling
- 9.3 Microbial growth during cooling
- 9.4 Home freezing

10.0 Drying and Dehydration Preservation
- 10.1 Dehydration
- 10.2 Food concentration
- 10.3 Home drying

11.0 Radiant and Electrical Energy Preservation
- 11.1 Food irradiation
- 11.2 Microwave heating
- 11.3 Ohmic (Electrical) healing

12.0 Fermentation, Microorganisms and Biotechnology Preservation
- 12.1 What is fermentation and its uses
- 12.2 Microorganisms as food
- 12.3 Genetic engineering of food

13.0 Food Additives Preservation
- 13.1 Preservative additives
- 13.2 Nutritional additives
- 13.3 Color modifiers
- 13.4 Flavoring agents
- 13.5 Texturing agents
- 13.6 Acidulants
- 13.7 Fat replacers
- 13.8 Hazards

14.0 Packing Preservation
- 14.1 Types of containers
- 14.2 package testing
- 14.3 Environmental considerations
- 14.4 Innovations in packaging

15.0 Milk
- 15.1 Grad and classes
- 15.2 Products and by-products
- 15.3 Milk substitutes

16.0 Meat
- 16.1 Grade and classes
- 16.2 Products
- 16.3 Meat substitutes

17.0 Poultry and Eggs
- 17.1 Grade and classes
- 17.2 Processing
- 17.3 Products
- 17.4 Defining "organic" and "cage-free"
- 17.5 Egg substitutes

18.0 Fish and Shellfish
- 18.1 Fresh and saltwater
- 18.2 Fishing versus aquaculture
- 18.3 Grad and classes
- 18.4 Products, by-products, and new products
- 18.5 Spoilage and storage

19.0 Cereal Grains, Legumes, and Oilseeds
- 19.1 Starches
- 19.2 Milling of grains
- 19.3 Corn refining
- 19.4 Breakfast cereals
- 19.5 Legumes
- 19.6 Soybeans

20.0 Fruits and Vegetables
- 20.1 Types of fruits
- 20.2 Grad and classes
- 20.3 Harvesting and reopening
- 20.4 Processing fruits and vegetables
- 20.5 By-products

21.0 Fats and Oils
- 21.1 Sources
- 21.2 Grad and classes
- 21.3 Productions methods
- 21.4 Monoglycerides versus diglycerides versus triglycerides
- 21.5 Fat and oil replacers

22.0 Candy and Confectionery
- 22.1 Sources of sugar
- 22.2 Chocolate and cocoa products
- 22.3 Manufacturing practices
- 22.4 Sugar substitutes

23.0 Beverages
- 23.1 Carbonated beverages
- 23.2 Herbal and healthful beverages
- 23.3 Bottled water
- 23.4 Alcoholic beverages
- 23.5 Coffee
- 23.6 Tea

24.0 Environmental concerns and processing
- 24.1 Water in food production
- 24.2 Disposable solid waste

25.0 Food Safety
- 25.1 Cross-contamination
- 25.2 Microorganisms: viruses, parasites, fungi, bacteria
- 25.3 Factors affecting microbial growth "FAT TOM"
- 25.4 Rodents, birds, and insects
- 25.5 Cleaning and sanitizing

26.0 World Food Needs
- 26.1 World hunger
- 26.2 Ways to combat world hunger
- 26.3 Technology and world hunger

27.0 Food and Health
- 27.1 Food and disease
- 27.2 Digestive disorders
- 27.3 Food allergies
- 27.4 Phytonutrients and nutraceuticals
- 27.5 Herbs

8. Instructional Goals

The course will introduce students to:

1.0 The 13 sustainable food standards and rating scale;

2.0 Quality standards of food, such as: appearance, texture, and flavor;

3.0 Types of food deterioration and the causes of deterioration;

4.0 The process of fermentation and its common uses;

5.0 Reasons for using food additives;

6.0 Properties, features, ripening, and harvesting of common fruits and vegetables;

7.0 Food safety factors affecting microbial growth, microorganisms, cross-contamination, rodents, insects, and sanitization;

8.0 Nutritional qualities of milk;

9.0 Types and changes of drying and dehydration; and

10.0 Genetic engineering and biotechnology's current and future effect on food.

9. Student Learning Outcomes

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

1.0 Identify sustainable food standards and analyze food in order to determine if it reaches acceptable standards;

2.0 Identify quality factors of food;

3.0 Recognize causes and signs of food deterioration;

4.0 Explain the fermentation process and identify common uses of it;

5.0 Understand the purpose of food additives;

6.0 Identify the optimal properties of common fruits and vegetables;

7.0 Analyze major factors affecting microbial growth "FAT TOM";

8.0 Analyze nutritional qualities of milk;

9.0 Describe how dehydration affects food; and

10.0 Synthesize the impact of technology on food.

10. Assessment Measures of Student Learning Outcomes

Assessment of student learning may include, but not be limited to, the following:

1.0 Assignments;

2.0 Laboratory experiments and reports;

3.0 Forum discussions; and

4.0 Section tests.