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.

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Proposer

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4/12/18
4/12/2018
APR. 12, 2018
4/12/18
4/12/18
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:
   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 student’s 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) heating

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.