

**Department:** ANSC (Cross-listed NUSC)

**Course No.:** 160

**Title:** The Science of Food

**Credits:** 3

**Contact Person:** Mike Darre

**Content Area:** CA3 Science and Technology

**Catalog Copy:** ANSC 160. The Science of Food. (Also offered as NUSC 160.) Second semester. Three credits. Staff.

An introductory level course for students interested in the application of science to food. Nutritional and functional attributes of various food constituents are discussed. Issues concerning food processing and food safety are covered.

**Course Information:**

a. Course Objectives:

1. To provide students with information and principles so that they can make informed decisions regarding consumption of food. 2. To introduce students to various food constituents and relate the function of these from both food processing and nutrition perspectives. 3. To provide students with an appreciation of processes and procedures associated with the acquisition of safe, nutritious, wholesome and appealing foods. 4. To provide students with an appreciation for the application of fundamental aspects of physical and biological sciences to food.

b. Course Requirements:

1. Exams and Quizzes. Exams: A total of 3 class exams and one final (cumulative) exam. Quizzes: A total of 7 short quizzes will be administered. Scores from the highest 5 quiz scores will be used for grading purposes. Quizzes and exams will cover lecture and handout/reading material since the previous quiz or exam. Information from discussion articles will be included on quizzes and exams.

2. Class Discussion Sessions. There will be five separate class discussion sessions, each held during the lecture hour, over the course of the semester. Scientific articles will be assigned for each discussion and these will be available on electronic and regular reserve at the Homer Babbidge Library. All students will be required to read the journal article prior to class discussion in order to participate meaningfully and to write a response paper. Students must participate and submit a written class discussion response paper for each of the sessions.

In order to facilitate the discussion activity, the class will be divided into appropriately sized discussion groups (ca. 6 to 8 students) with one-half of the group assuming the viewpoint of proponent, and the remaining half the viewpoint of an opponent.

Proponents and opponents will respond to the questions listed in the course calendar. Each discussion group will have a student facilitator and recorder so that discussion summaries can be presented to the entire class.

**Class Discussion Response Paper.** Prior to the discussions period, all students will read a short article on the discussion topic and then write a one-page, typed (22 lines, Times New Roman, 12 pt. font, 1-inch margins all around, double spaced) proponent or opponent summary and opinion paper for each discussion topic. The summary of the article is to be no longer than six lines. The remaining sixteen lines are to be your opinion or commentary on the article from either a proponent or opponent viewpoint. Each student's discussion paper is to be submitted at the end of the discussion class. The instructor will review and grade the discussion papers.

3. **Experiential Activity.** There will be 2 or 3 required experiential activities required – one of these will be during the class hour and the other(s) outside of class as homework. The specific nature of these changes on an annual basis (e.g. cow milking and ice cream manufacture) and specific activities will be discussed during the first lecture.

c. **Major Topics.**

Introduction to the Science of Food

Nutrient Composition and Functional Characteristics of Nutrients

Food Proteins, Food Enzymes

Food Biotechnology and GMOs

Food Lipids: Types, Trans vs Cis, Saturated vs Unsaturated, Oxidation

Food Carbohydrates: Simple, Complex, Sweetener Substitutes

Quality and Sensory Characteristics of Foods

Food Microbiology and Fermented Foods

Food Microbiology and Safety

Food Spoilage: Microbiological and Chemical Bases

Food Irradiation

Food Toxicology and Allergy

Food Ingredient Chemistry and Additives

Food Labeling and Consumer Concerns

Physical and Chemical Approaches to Food Processing & Preservation

Manipulation of Food Environments via Packaging Engineering

Food Law and Government Regulation

Good Manufacturing Practices; Strategies for Cleaning and Sanitizing

Water and Waste Water in Food Processing

**Meets Goals of Gen Ed.:** -"The purpose of general education is to ensure that all University of Connecticut undergraduate students:"

"Acquire intellectual breadth and versatility"- Students will gain an appreciation for science that is invested in the

production and processing of food. The processing of food from material to raw product is a scientific process that considers issues of quality, safety and nutrition. Students have daily contact with food and food advertising and thus have a context within which to apply the basic scientific and technological principles discussed in class. It is critical that there be an

understanding that foods do not just “appear” on supermarket shelves. Students will learn about the application of physical, chemical and biological concepts to foods as they are processed and consumed.

"Acquire critical judgement" - Discussion sessions require students to read and critically analyze current articles about foods and food-related issues, and then present and discuss their points of view to other students in the class. Additionally, the lecture(s) concerned with Food Biotechnology will provide an opportunity for students to understand the basis by which genes and gene manipulation can lead to improved food products.

"Acquire awareness of their era and society": Food and diet, and the manipulation of foods via traditional (processing/packaging) and biotechnological means (GMOs) are issues of constant interest and debate in society. The course will provide an opportunity to learn about current issues and how to use the material presented and learned for decision-making regarding personal food choices. Additionally, a historical outline of the development of various food products and processing methods will elucidate the role of the military in food product/process development, and how foods have changed over time. Finally, an appreciation for the changing demands of consumers, and how the current food supply has evolved to its present form. Students will be able to extend their understanding of the scale needed to supply food in a safe, nutritious and high quality format to a growing world population and at the same time gain an understanding of how modern science will play a role in achieving this.

"Acquire a working understanding of the processes by which they can continue to acquire and use knowledge": In addition to lecture format and discussion style teaching, course activities will also provide students with first-hand experiences in the harvesting and processing of selected foods (e.g. dairy products). This combination of approaches will make the material ‘real’ for students and provide a context within which to learn more about the subject whether it be informal (e.g. issues-related topics in popular press) or formal (scholarly publications and/or additional coursework).

**CA3 Criteria:** -See also answers to the questions regarding the meeting of General Education goals.

1. Explore an area of science or technology by introducing students to a broad, coherent body of knowledge and contemporary scientific or technical methods.

This course introduces the rather large field of food production and processing. It concentrates on such areas as the components of food, food processing methods, food ingredients, and food safety. Students have daily contact with food and food advertising and thus have a context within which to apply the basic scientific and technological principles discussed in class to their everyday lives.

2. Promote an understanding of the nature of modern scientific inquiry, the process of investigation, and the interplay of data, hypotheses, and principles in the development and application of scientific knowledge.

The successful production and processing of food require information obtained through scientific research. Both quantitative and qualitative methods of inquiry will be discussed during the term. Contemporary issues such as irradiation of foods for safety, genetic manipulation of animals and plants for food production purposes and the processing of foods for specific nutritional benefits will be addressed from a scientific viewpoint.

3. Introduce students to unresolved questions in some area of science or technology and discuss how progress might be made in answering these questions.

A safe, nutritious food supply is constantly facing new challenges either from new knowledge about food components or from external agents such as microorganisms that might make food unsafe. For example, the manipulation of proteins in a given plant-based food raises a concern for potential food allergies. The emphasis will be on scientific approaches for answering unresolved questions despite the fact that economic considerations may also be critical to solving problems.

4. Promote interest, competence, and commitment to continued learning about contemporary science and technology and their impact upon the world and human society.

Students will learn sufficient material about the food supply so that they will be prepared to question claims made by industry, the government or interest groups, and so that they can continue to gather information about foods of interest to them and others.

**Supplementary Information:** This course is co-listed as NUSC 160.