COURSE OUTLINE OF RECORD

Number: BIOL G101  TITLE: The Biology of Food and Cooking

ORIGINATOR: Nikki Plaster  EFF TERM: Fall 2014
FORERELKNOWNAS:

DATE OF
OUTLINE/REVIEW: 10-01-2013

CROSS LISTED COURSE:

TOP NO: 0401.00

CID:

SEMESTER UNITS: 3.0

HRS LEC: 54.0  HRS LAB: 0.0  HRS OTHER: 0.0

CONTACT HRS TOTAL: 54.0

STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:
The Biology of Food and Cooking is a lecture-only survey course covering the same topics as Biology G100: Introduction to Biology (non-majors) with a focus on examples from food and cooking. In this demonstration-filled class we will use the methods and reagents of the kitchen to learn the basics of molecular and cell biology, genetics, ecology and evolution. Despite the fact that there is not an associated lab with this course, critical thinking skills and practice with the scientific method will be addressed through the many in-class demonstrations, small group activities, and “kitchen experiments” (out-of-class assignments). Access to a kitchen is required to complete some assignments.

JUSTIFICATION FOR COURSE:
This course aims at encouraging an interest and understanding of biology through a topic that students encounter on a daily basis, food and cooking. The popularity of food and cooking has been enlivened by TV networks such as The Food Network, personalities and celebrity chefs such as Alton Brown, social movements for sustainability such as Slow Food and community supported agriculture. This has increased the public’s awareness for the link between science and food/cooking, and has made courses such as this one an attractive alternative to a more traditional general biology class. Many prestigious universities such as Harvard, MIT and locally, UC Irvine offer similar popular courses for the non-majors audience. Golden West College’s Biology G101: The Biology of Food and Cooking will follow a very similar course outline as UCI’s Bio 9B: Biology and Chemistry of Cooking and Orange Coast College’s A101: The Biology of Cooking.

This course will teach students how to use the scientific method and will survey different topics in biology such as molecular and cell biology, ecology, and evolution by tying in their inherent interest in food and cooking. It will provide students with a lecture-only alternative to Biology G100: Introduction to biology for non-majors in a highly interactive class.

PREREQUISITES:

ADVISORIES:

• CHEM G110: Introduction to Chemistry with a grade of C or better
  or
• AP Chemistry with a grade of C or better
  or
• AP Biology with a grade of C or better

ASSIGNED DISCIPLINES:

Biological sciences
use critical thinking skills.

**COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:**

1. Assess current biological issues such as the use of genetically modified crops and organisms, sustainability, the population question and the accelerating depletion of natural environments and resources.

2. Describe the core concepts and methods in general biology including: the biochemistry of the essential macromolecules and their prevalence in particular foods, the evolution of plants/animals/microorganisms that relate to food, plant/animal physiology, and the ecological implications of agriculture.

3. Design an experiment using the Scientific Method.

4. Apply critical thinking and analytical skills to correctly interpret data.

**COURSE OBJECTIVES:**

1. List and describe the steps of the scientific method, and critically examine food/cooking-based experimental questions using the scientific method.

2. Describe the four categories of biomolecules including their structure and function in a biological system and as they pertain to food and cooking.

3. Explain the properties of water, pH, heat transfer, and transport with particular focus on their roles in food and cooking.

4. Describe basics of cell structure and the flow of genetic information in the cell.

5. Explain the principles of inheritance especially in regard to agriculture.

6. Describe the processes of photosynthesis and cellular respiration particularly with respect to food production.

7. Describe the basic features of physiological systems such as the human nervous system, animal digestion and plant hormone regulation.

8. Explain the modern theory of evolution and the role of natural selection with particular focus on food.

9. Describe the impact of human food production, farming, land use, and diet on the environment.

**COURSE CONTENT:**
LECTURE CONTENT:

A. The Scientific Method

B. Chemistry and biochemistry
   1. Atoms, chemical bonds, and molecules
   2. Water and pH
   3. Organic biomolecules

C. Cell biology
   1. Prokaryotic cell structure and function
   2. Eukaryotic cell structure and function
   3. Molecular movement
      a. Diffusion
      b. Osmosis

D. Physiology and anatomy
   1. The human nervous system
      a. Taste
      b. Smell
   2. Metabolism
      a. Photosynthesis
      b. Aerobic respiration
      c. Fermentation
   3. Animal digestive system
      a. Digestion
      b. Hormone regulation with regard to digestion and satiety
   4. Plant biology
      a. Anatomy
      b. Growth and hormone regulation

E. Molecular biology and genetics
   1. Cell division
      a. Mitosis
      b. Meiosis
2. Transcription and translation
3. Mutation
4. Inheritance

F. Evolution
1. Mechanisms of evolution
   a. Natural and artificial selection
   b. Genetic drift
   c. Gene flow
2. Evolutionary history of food species

G. Diversity of living organisms and their implications on food and health
1. Prokaryotes
2. Protists
3. Fungi
4. Plants
5. Animals

H. Ecology
1. Populations, communities, and ecosystems
2. Sustainability

The course topics outlined above will be covered in the following units:

A. You are what you eat
1. Chemistry and biomolecules
2. The human digestive system

B. Experiencing Food
1. Energy transfer: cooking methods
2. Cell biology
3. The nervous system and your senses of smell and taste

C. Milk and dairy
1. Milk biology and chemistry
2. Yogurt and cheese production
   a. Introduction to bacteria and fungi
   b. Introduction to fermentation

D. Eggs
1. Egg biology and chemistry
2. Cooking with eggs

E. Meat
1. Comparative physiology (aquatic versus terrestrial muscle) and biology of meat
2. Domestication and meat production
3. Meat consumption and health
4. Cooking methods
5. Sustainability

F. Fruit and vegetables
1. Plant cell structure and the effects of cooking
2. Photosynthesis
3. Plant anatomy
4. Evolutionary history of plants
5. Ecology and sustainability

G. Bread, cakes, pastries and pasta
1. Biology and chemistry of seeds
2. Gluten formation
   3. Starch digestion

H. Wine, beer and distilled spirits
1. Cellular respiration
2. Yeast biology

I. Chocolate, candy, tea and coffee
1. The chemistry of sugar
2. Sugars and health
3. Chocolate production
4. Chemistry and production of tea and coffee

METHODS OF INSTRUCTION:

A. Lecture:
B. Independent Study:

INSTRUCTIONAL TECHNIQUES:

Lecture, in-class demonstrations, discussions, small group activities in class, multimedia presentations, out-of-class assignments, supplemental reading assignments.

COURSE ASSIGNMENTS:

Writing Assignments
Each exam will have a written component included.
At-home kitchen activities will require written evaluations by the student.
There will be at least one written out-of-class assignment that will require independent library or online research demonstrating proper citation.
Some in-class activities will require a short essay on a lecture topic or written critical evaluation of data.

Reading Assignments
Textbook and supplemental reading assignments will be required to prepare for each lecture.
Independent research (library and online) will be required for in-class activities and out-of-class assignments.

Out-of-class Assignments
Completion of reading assignments to prepare for lecture as detailed by the class schedule.
Studying of class material for quizzes and exams.
Preparation of out-of-class writing assignments and at-home projects as detailed in the syllabus.

METHODS OF STUDENT EVALUATION:

Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Projects (ind/group)
Problem Solving Exercises

Demonstration of Critical Thinking:
Multiple at-home projects and written assignments, small group work and discussions in class, in-class exams with at least 25% essay-style responses
Required Writing, Problem Solving, Skills Demonstration:
Multiple at-home projects and written assignments, small group work and discussions in class, in-class exams with at least 25% essay-style responses

TEXTS, READINGS, AND RESOURCES:

TextBooks:

LIBRARY:
Adequate library resources include:
Comments:

Attachments:
Attached Files