BIOL G101: THE BIOLOGY OF FOOD AND COOKING

Item	Value
Curriculum Committee Approval Date	10/06/2020
Top Code	040100 - Biology, General
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• GWC Physical Universe*** (GB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5B Biological Sciences (5B)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5B Biological Sciences (5B)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B2 Life Science (B2)

Course Description

This course is a lecture-only course covering the foundational biological concepts with an emphasis on the biochemistry of common food macromolecules, the consequences of cooking techniques on these macromolecules, carbohydrate metabolism, and the impacts of genetic engineering and modern agriculture on ecosystems and food security. In this class we will use in-class demonstrations, small group activities, and “kitchen experiments” (out-of-class assignments) to learn the scientific method and practice critical thinking skills. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Describe the biochemistry of the essential macromolecules in relation to food and nutrition.
3. Design an experiment using the Scientific Method.
4. Apply critical thinking and analytical skills to correctly interpret data.
5. Assess current newsworthy agricultural issues using evidence-based reasoning.
6. Organize the processes of energy metabolism.

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.

Lecture Content

The Scientific Method Chemistry and biochemistry Atoms, chemical bonds, and molecules Water and pH Organic biomolecules Cell biology Prokaryotic and eukaryotic cell structure and function Molecular movement Physiology and anatomy The human nervous system Energy metabolism Animal digestive system Plant biology Anatomy Growth and hormone regulation Molecular biology and genetics Cell division Central dogma of molecular biology Inheritance Evolution Mechanisms of evolution Evolutionary history of food species Diversity of living organisms an their implications on food and health Ecology Populations, communities, and ecosystems Sustainability The course topics outlined above will be covered in the following units: You are what you eat Chemistry and biomolecules The human digestive system Experiencing Food Energy transfer: cooking methods The nervous system and your senses of smell and taste Milk and dairy Cell biology Milk biology and chemistry Yogurt and cheese production Introduction to bacteria and fungi Introduction to fermentation Eggs Egg biology and chemistry Sexual reproduction Cooking with eggs Meat Comparative physiology (aquatic versus terrestrial muscle) and biology of meat Domestication and meat production Meat consumption and health Cooking methods Sustainability Frui t and vegetables Plant cell structure and the effects of cooking Photosynthesis Plant anatomy Evolutionary history of plants Ecology and sustainability Bread, cakes, pastries and pasta Biology and chemistry of seeds Gluten formation Starch digestion Alcohol Cellular respiration Yeast biology Chocolate, candy, tea and coffee The chemistry of sugar Sugars and health Chemistry and production of tea and coffee Chocolate production

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

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

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.

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.

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.

Demonstration of Critical Thinking

Multiple at-home projects and written assignments, small group work and discussions in class, in-class exams with some 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 some essay-style responses

Eligible Disciplines

Biological sciences: Masters degree in any biological science OR bachelors degree in any biological science AND masters degree in biochemistry, biophysics, or marine science OR the equivalent. Masters degree required.

Textbooks Resources

1. Required McGee, H.. On Food and Cooking: The Science and Lore of the Kitchen(Classic), 2nd ed. Scribner, 2004 Rationale: Harold McGees 2004 updated version of On Food and Cooking is the most up-to-date and complete text available discussing the topics that are critical to this course. Any new equivalent texts that adequately cover the topics in this course could be used in place of McGee. 2. Required Fowler, S., Roush, R., and Wise, J.. Concepts of Biology, 2 ed. Openstax (OER), 2017