

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: BIO-107 L . Class/Lect Hours: 3 Lab Hours: 2 Credits: 1 Dept.: Biology

Course Title: World Food Habits and Sustainability Lab Semester: Fall Year: 2016

Course Description, Prerequisite, Corequisite:

This lab provides an introduction to changes in human food habits in relation to human evolution. Students will explore human diet from around the world with special focus on nutrition which includes the study of carbohydrates, fats, proteins and other nutrients. Students will also gain a workable knowledge of digestion, absorption, metabolism, nutrition guidelines, food preservations, fermentation and sustainability of food systems. The lab will be supplemented by several field trips to institutions and farms to study applications of food biotechnology and effects of climate change on food sustainability.

Prerequisites, Corequisites- BIO 107 lecture.

Textbooks- none. Research papers and links for web based reading will be provided in class and blackboard.

Course Objectives	Competencies
<p>Primary learning goals addressed:</p> <ol style="list-style-type: none"> 1. Quantitative literacy 2. Critical and Ethical thinking 3. Computer literacy 4. Written and oral communication 5. Information literacy <p>I. Understand the basics of human nutrition. Energy, diet and weight.</p> <p>II. Understand human evolution by comparison of hominid skulls.</p> <p>III. Learn the macronutrients in food and describe their estimation procedures.</p>	<p>Students completing this course will be able to:</p> <ol style="list-style-type: none"> 1. Understand the energy use and balance in humans. 2. Describe how energy is measured. 3. Determine their personal Basic Metabolic Rate. 4. Understand the factors that control daily energy requirements and the four main energy uses in the human body and procedure to measure them. 5. Learn how to count calories in the food they eat. 6. Determine their personal ideal weight for ideal health. 7. Estimate percentage body fat and Body mass index with the Omron body fat analyzer. <ol style="list-style-type: none"> 1. Explain human evolution by changes in anatomical features of the ancient human skull composites. 2. Students will be able to describe and compare cranial casts from hominids. 3. Able to link human evolution, fossils and ancient tools to changes in food habits. 4. Develop a phylogenetic tree for the living and extinct members of the family Hominidae. <ol style="list-style-type: none"> 1. Identify the presence of major nutrients such as simple carbohydrates (glucose), complex carbohydrates (starch), protein and fat in common foods. 2. Learn the test for simple Carbohydrates using Benedict's solution. 3. Demonstrate test for complex Carbohydrates using Iodine Solution.

IV. Explain the process of human digestion and demonstrate the process of enzymatic digestion of macromolecules in the body.

V. Describe common food additives, identify its function and any problems associated with it.

VI. Explain the common methods of food preservation.

4. Explain test for Protein (amino acids) using Biuret solution.
 5. Demonstrate the test for Fats (lipids) using Sudan IV indicator.
 6. Learn the importance of micronutrients, vitamins and minerals essential for life.
 7. Study and understand food labels.
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1. Describe the basic anatomy and physiology of the human digestive tract and accessory organs.
 2. Demonstrate digestion of starch by amylase.
 3. Describe the digestion of protein by pepsin.
 4. Describe lipid digestion by lipase.
 5. Show the importance of bile in fat digestion.
 6. Explain the effect of adverse environmental factors on enzyme action.
 7. Describe the role of fiber in diet.
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1. Explain the role of both natural and synthetic preservatives used in food preparation.
 2. Demonstrate the role of lemon juice, citric acid, vitamin C and sugar in preventing oxidation of select fruits and vegetables...
 3. Examine the food labels of global processed foods to determine the food additives present and categorize them by their function.
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1. Explain the principle and common practices in food preservation from around the world.
 2. Understand the environmental conditions for microbial growth and relate to food preservation.
 3. Disclose common techniques in food preservation such as low temperature, high temperature, fermentation, adding salt (sugar or acid), canning and dehydration.
 4. Demonstrate the process of canning fruits and vegetables.
 5. Demonstrate preservation by salting.

VII. Describe the advantages of fermentation and name some common fermented foods of the world.

1. Understand the process of fermentation and its nutritional benefits.
2. Demonstrate the process of making Kimchi.
3. To understand conditions that influence growth and fermentation of yeast (*Saccharomyces cerevisiae*).
4. Illustrate how biological, physical, and chemical activities are involved in the production of fermented foods.
5. Demonstrate yogurt making using *Lactobacillus bulgaricus*.
6. Demonstrate how enzymes derived from microorganisms can be used to convert simple corn starch to high fructose corn syrup.

VIII. Field Trip: Visit to ethnic food farms in Western Massachusetts to study practices in sustainability.

1. Understand what it means to be environmentally sustainable.
2. Describe food habits of ethnic communities in Western Massachusetts
3. Explain production practices farms that produce Southeast Asian and Middle East foods.
4. Narrate the problems facing such specialty farms.
5. Learn farm management techniques for specialty food production and sustainability
6. Learn common practices in organic farming.

IX. Field Trip: Visit to permaculture gardens at UMass

1. Describe the principles of permaculture.
2. Understand how to establish a permaculture garden.
3. Describe the choice of food items to grow in a permaculture setting.
4. Describe maintenance and operations to produce and process vegetables
5. Explain how specific vegetables are cultivated to supply Franklin Dining Commons

X. Field Trip: Climate Change (Climate center at UMass)

1. Explain climate change projections.
2. Understand climate impacts on food production.
3. Learn about the role of natural disasters on food access.
4. Understand the role of drought and floods on world food.
5. Use online tools to evaluate climate impacts on a country.

XI. Field Trip: Aquaponics and urban gardens (in Holyoke)-

1. Understand the aquaponics systems to produce green vegetables.
2. Learn the growing cycles in an aquaponics system.
3. Learn urban gardening.
4. Handling quality of greens in a closed environment.
5. Water and energy needs of a production plant.
6. Issues in supply to urban food industry.

XII. Field Trip to Nourse farms in Deerfield to study berry tissue culture and applications of DNA technology.

1. Describe the process of plant tissue culture.
2. Explain the advantages over traditional propagation methods.
3. Understand micro propagation by tissue culture to produce disease free genetically identical plants.
4. Understand the role of DNA technology to produce virus free stocks.