BISC 115Lxg The Biology of Food
Spring Semester 2019
(Section 13115)

Lecture Syllabus

Lecture: Tuesday and Thursday 2:00 – 3:20pm
Location: SGM 101

Instructor: Grayson Jaggers, PhD
Office: ZHS 256
Office Hours: Tuesdays 12:00-1:00pm and Fridays 1:00-2:00pm
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Course Description and Learning Objectives

Food is something we all have some sort of a connection with. Whether you see it as a tool for artistic expression, or simply as fuel for your body, food is derived from the living world around us. BISC 115Lxg will relate concepts from the biological sciences in an applicable context by using the food we eat to provide students with an understanding of molecular biology, biochemistry, microbiology, and nutrition.

Along with lectures, students will attend weekly lab meetings. The goal of our lab meetings is to further illustrate concepts learned in lecture, and doing so in a hands-on environment. In addition to this, the labs will introduce students to experimental design and emphasize critical thinking skills. Students will work together to carry out experiments, where they will be required to analyze and thoughtfully summarize their results.

Students from a variety of majors will leave this course having learned how the food they eat relates to the biological world. In addition to this, they will have an improved ability to think critically, analyze, and utilize information in order to solve problems in their everyday life. This course seeks to promote further interest in the biological sciences, as well as foster an appetite for cooking, and exploring the culinary world.

I. Suggested Reading

McGee, Harold. *On Food and Cooking: The Science and Lore of the Kitchen*. Revised Edition: First Scribner, 2004.

Field, Simon Quellen. *Culinary Reactions: The Everyday Chemistry of Cooking*. Chicago Review Press, 2012.

Crosby, G., and The Editors of America's Test Kitchen. *The Science of Good Cooking.* First Edition: Cook's Illustrated, 2012.

II. Description and Assessment of Assignments

Exams will be based upon concepts discussed in lectures. Any information presented outside of lecture will not be tested upon, unless specifically stated.

Homework will be assigned and due at each lab meeting. Each assignment is worth 6 points.

III. Grading Breakdown

Three exams, and your six lab meetings will determine your course grade. Each exam will be worth 100 points. Each lab meeting will be worth a total of 20 points

Midterm 1: 100 points
Midterm 2: 100 points
Final Exam: 100 points

Lab Homework (10 x 6 points): 60 points
Lab Participation (10 x 6 points): 60 points
Class Total: 420 points

A range: 90% and Up
B range: 80-89%
C range: 70-79%
D range: 55-69%
F: 54% and Below

Attendance: Laboratory and exam attendance is mandatory, and there are no make-up test or assignments. The only exceptions to this policy are for those who have a medical emergency (stuffy noses don't count), in which case proper documentation will be required. Also, if you are a member of a university club or athletic team, and you know in advance that you cannot attend a specific meeting, please let me know as soon as possible.

Food Consumption and Lab: Due to the fact that our laboratory spaces are shared with other courses, consumption of any food items will not be allowed. In the event that we conduct any of our labs in a food-safe environment, this policy may be revised. Any violation of this policy will result in loss of lab participation points for that given lab meeting.

IV. Tentative Lecture and Lab Schedules

Week	Topics Covered/Schedule	Associated Reading
1	Course Overview, Four basic food molecules (Fat, Protein, Carbohydrates, Water), History of food and health	McGee: pp 792-818 Field: pp 1-7, 79-93, 161-69
2	Animal Tissue structure, cellular components, and nutrition.	McGee: pp 129-40, 147-65, 206-12, 278-87 Field: pp 114, 118, 171-84 Crosby: pp 16-89, 136-39, 160-67
3	Maillard reactions, Eggs: Biological components, Nutrition	McGee: pp 68-113 Field: pp 117-18, 9-28 Crosby: pp 168-205
4	Gels, Suspensions, Emulsifications	McGee: pp 580-637 Field: pp 37-54 Crosby: pp 206-09, 314-17
5	**Midterm 1 Review, Midterm 1**	
6	Bacterial Biology	McGee: pp 8-66 Field: pp 116, 120, 141-145
7	Sensory receptors, and cell signalling, Molecular basis of flavor.	McGee: pp 147, 188, 270 Crosby: pp 24-32, 308-13
8	Biology of plant tissues	McGee: pp 639-44 Crosby: pp 102-35, 212-25, 256-61
9	Dairy Nutrition, Fermentation	McGee: pp 172-78, 291-98 Field: pp 148-52
10	**Midterm 2 Review, Midterm 2**	
11	History of wheat production and genetic modification.	McGee: pp 517-69 Field: pp 14, 134-41, 185 Crosby: pp 326-417
12	Sugar: Nutrition and Impact on health.	McGee: pp 647-56, 670-87 Field: pp 107-09, 190 Crosby: pp 410-25
13	Biology of chocolate: molecular basis of chocolate's flavor and health benefits, fermentation.	McGee: pp 694-712 Crosby: p 426-35
14	Yeast biology, anaerobic metabolism. Alcohol: Nutrition, health, alcohol in cooking	McGee: pp 715-76 Field: p 134-36 Crosby:
15	Oxidation and Reduction reactions, Antioxidants, **Final Exam Review**	McGee: pp 145-47, 189, 202-06, 273-77 Field: pp 187-220
16	**Final Exam**	

Lab #	Week of -	
1	Jan 7	No Lab
2	Jan 14	Lab Introduction, Lab Safety, Safe food Handling Practices
3	Jan 21	Fermentation Experiment Set Up (Flour/Water and Kim Chi)
4	Jan 28	Flour Fermentation results / GMO Detection, part 1
5	Feb 4	GMO Detection, part 2
6	Feb 11	GMO Detection, part 3
7	Feb 18	Taste Receptors
8	Feb 25	Aroma Compounds
9	Mar 4	Protein Isolation
10	Mar 18	Grocery Store Meat Inspection
11	Mar 25	Vitamin C Content in Raw and Cooked Foods
12	Apr 1	Calorimeter
13	Apr 8	Fermentation Experiment Results (Kim Chi)
14	Apr 15	Ice cream/Sorbet Experiment
15	Apr 22	No Lab

V. Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* (http://dornsife.usc.edu/ali), which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* (http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* (*http://emergency.usc.edu/*) will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

VI. Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* (https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/). Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, (http://policy.usc.edu/scientific- misconduct/).

VII. Academic Integrity Violations

Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University. Since dishonesty in any form harms the individual, other students and the University, academic integrity policies will be strictly enforced.

VIII. Disruptive and Threatening Behavior

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* (http://equity.usc.edu/) or to the *Department of Public Safety* (http://capsnet.usc.edu/department/department-public-safety/online-forms/contact- us). This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* (http://www.usc.edu/student-affairs/cwm/) provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.