

BISC 438 Nutritional Biochemistry (4 Units)
2020 Fall Semester
Syllabus

Day/Time: Monday, Wednesday, and Friday 3:00 - 3:50pm

Location: Anywhere with an internet connection.

Instructor: Grayson Jagers, PhD

Office: Zoom, but also ZHS 256

Office Hours: By Appointment

Email: jagers@usc.edu (Please allow 24 hours for a response)

Course Description

We all understand that the carbohydrates, proteins, and fats we consume provide our bodies with energy, but there are biologically-active nutritional chemicals that do not provide energy. What roles do these molecules serve in our body? By what mechanisms do they impact our health? These are the questions that we will address throughout this course.

The class will consist of a mixture of lecture and in-class discussion. Topics covered include, amino acid metabolism, lipid synthesis, and the metabolic functions of vitamins and minerals. The course will also explore the functions of biologically-active non-nutrients such as caffeine and phytochemicals. This course will reinforce the principles taught in BISC 330/312, and expand upon them as students learn the biochemical basis of nutrition's impact on metabolic functions.

Learning Objectives

After completion of homework, in-class discussions and examinations, students should be able to effectively execute the following:

1. Clear written communication of complex concepts in biochemistry.
2. Compare and contrast biochemical regulatory mechanisms.
3. Establish connections between the metabolism of various nutrients.
4. Establish connections between nutrient metabolism and nutrition-based diseases.

Prerequisite: BISC 330L (Biochemistry), or BISC 312 (Molecular Biochemistry)

I. Textbook (Optional)

Stipanuck, Martha H., Caudill, Marie A. Biochemical, Physiological, and Molecular Aspects of Human Nutrition (3rd Edition, 2012).

II. Description and Assessment of Assignments

Exams are typically 30% multiple-choice, and 70% written response. They will be based upon concepts discussed in lecture and homework. Any information presented outside of lecture or homework assignments will not be tested upon, unless specifically stated.

Homework contains problems that require a written response. Homework that receives full credit will be turned in before the beginning of class, and contains well-reasoned and accurate responses to the questions. Late homework will not be accepted. Exceptions can be made for students under certain circumstances.

Short quizzes will also be regularly presented on blackboard. They will generally be comprised of a couple multiple-choice, fill-in-the-blank, or true/false questions.

III. Grading Breakdown

The course grade will be based upon three lecture exams, homework, and quizzes. Each exam will be worth 100 points, and 20% of the overall grade. Homework assignments will vary in length, and total 30% of the overall grade. There will be ten short homework assignments worth 5, and ten longer assignments worth 10 points. All quizzes will be worth 2 points each, and total 10% of the overall grade.

Midterm 1: 100 points

Midterm 2: 100 points

Final Exam: 100 points

Homework (20 assignments): 150 points

Short Quizzes (25 x 2 points): 50 points

Total: 500 points

Typical Grade Breakdown:

A range: 80-100%

B range: 70-79%

C range: 60-69%

Attendance: Exams must be taken during the scheduled class period. Accommodations can be made for students taking the class from outside of the United States. Attendance in lecture is not required, but is recommended, as we will be reviewing homework as well as going over lecture material.

IV. Tentative Lecture and Exam Schedule (Subject to change)

Lecture Schedule		
Week	Date	Topic
1	17-Aug	Intro to Nutritional Biochemistry, Review of Glycolysis and β -oxidation
	19-Aug	Digestion and Absorption
	21-Aug	Digestion and Absorption of Carbohydrates and Protein
2	24-Aug	Lipid Digestion and Absorption
	26-Aug	Amino Acid Metabolism I
	28-Aug	Amino Acid Metabolism II
3	31-Aug	Lipid Metabolism
	2-Sep	Cholesterol Synthesis and Metabolism
	4-Sep	Fuel Regulation
4	7-Sep	Labor Day
	9-Sep	Energy Balance
	11-Sep	Review for Midterm
5	14-Sep	Midterm 1
	16-Sep	Water-Soluble Vitamins - Niacin
	18-Sep	Water-Soluble Vitamins - Riboflavin & Thiamin
6	21-Sep	Water-Soluble Vitamins - Folate and Choline
	23-Sep	Water-Soluble Vitamins - Vitamin C
	25-Sep	Fat-Soluble Vitamins - Vitamin E
7	28-Sep	Fat-Soluble Vitamins - Vitamin K
	30-Sep	Fat-Soluble Vitamins - Vitamin A
	2-Oct	Fat-Soluble Vitamins - Vitamin D
8	5-Oct	Mineral Metabolism - Calcium
	7-Oct	Mineral Metabolism - Calcium
	9-Oct	Mineral Metabolism - Iron
9	12-Oct	Review for Midterm
	14-Oct	Midterm 2
	16-Oct	Mineral Metabolism - Iodine
10	19-Oct	Water Balance
	21-Oct	Alkaloids
	23-Oct	Alcohol Metabolism
11	26-Oct	Alcohol Metabolism
	28-Oct	Polyunsaturated Fatty Acids
	30-Oct	Polyunsaturated Fatty Acids
12	2-Nov	Polyphenols
	4-Nov	Polyphenols
	6-Nov	Polyphenols
13	9-Nov	Phytosterols
	11-Nov	Phytoestrogens
	13-Nov	Review for Final

Final Exam: Monday, November 23rd, 2-4 PM (Pacific Time)

Presentation of Lecture Materials and Zoom:

Lectures slides and homework assignments will be made available ahead of the scheduled lectures. Lectures will be conducted using the Zoom platform, available through Blackboard. Lecture recordings will also be made available through Blackboard.

V. Course Modifications Due to Potential COVID-19 Illness

Under normal circumstances, it possible that any of us become too ill to perform our usual duties. The current pandemic only serves to further highlight this fact. In order to prepare for such an event, I will prepare as much of the course material ahead of time. I will have scheduled release of the material, so that the class may resume as normally as possible. If needed, another faculty member will aid in the completion of the course.

VI. 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.

VII. 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>.

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://adminopsnet.usc.edu/departments/public-safety>. This is important for the safety of the 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 <http://sarc.usc.edu> describes reporting options and other resources.

VIII. 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.

IX. 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/departments/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.

End-of-Semester Evaluations

I value your thoughts on the course, and myself, as your instructor. At the end of the semester, please take time to complete the course and instructor evaluations. I am always trying to improve the course, and this is a great way for me to utilize your insight.