

Illinois State University  
Department of Chemistry

380A64

3 credit hours

**The Biochemistry of Nutrition, Exercise, and Sports Medicine: What Do We Know and How Do We Know This?**

**Catalog Description:**

**TITLE: The Biochemistry of Nutrition, Exercise, and Sports Medicine**

**3 sem. Hrs.**

Previous Biochemistry course (CHE 242 or 342 or equivalent or permission of the instructor).

**Description:** Analysis of the biochemistry of nutrition and exercise and how these can be used to understand their complex interactions.

For credit for the MSCE/MCE program. Not for credit in the M.S. in Chemistry program. Not for credit for CHE, BIC or CTE majors; can be taken for credit in the Chemistry minor.

**Instructor:**

**Instructor:** Dr. Marjorie A. Jones

**Phone:** (309) 438-2366

**Office:** 320 Science Lab Building

**email:** [majone3@ilstu.edu](mailto:majone3@ilstu.edu)

**Office hours:** by appointment through email, phone or in my office

**Materials:**

Any introductory biochemistry text such as Biochemistry A Short Course by Tymoczko et al. , 3<sup>rd</sup> Edition, Freeman and Company, New York , 2015 or Lehninger Principles of Biochemistry, 6<sup>th</sup> edition, by Nelson and Cox, Freeman and Company, New York, 2013 (not required) and access to articles through Milner Library and SciFinder and other on-line search tools.

**Contact Hours:**

This 3 credit hour course is a structured course available online for 8 weeks during the summer term. Thus I assume that students should anticipate spending about 120-150 total hours on this course (15-20 hours per week). Each

assignment will be available at the start of the course but will have specific deadlines for when they will need to be completed.

You can contact me by email and on your Reggienet by clicking on “Messages”; our course Reggienet address is not yet determined but will be before the course starts

I will try to respond to any message within 24 hours if possible.

### **Accommodations:**

“Any student needing to arrange a reasonable accommodation for a documented disability and/or medical/mental health condition should contact Student Access and Accommodation Services at 350 Fell Hall, (309) 438-5853, or visit the website at [StudentAccess.IllinoisState.edu](http://StudentAccess.IllinoisState.edu).”

### **Course Overview and Objectives:**

Analysis of the biochemistry of nutrition and exercise and how this biochemistry discipline can be used to understand the complex interactions of nutrition and exercise as well as the practical applications of this understanding. A special emphasis of this course will be to read and critically analyze both the biochemistry literature as well as the ‘popular press’ type of literature and apply the analyses to real life problems.

This is an on-line class for non-majors undergraduates and MCE/MSCE students. This will be helpful for high school teachers, among others, in several disciplines who work with students who are very interested in exercise training and nutrition but need more information than they get from the companies that sell the food supplements and training films.

This course will be a problem solving course involving chemistry, biochemistry, and physiology especially directed to the title topic.

The course will involve selected readings, especially how to analyze the literature and experimental designs involved with these important areas. Specific areas of biochemistry reading will also be assigned involving proteins and amino acids, carbohydrates (sugars), lipids, and nucleic acids as well as some review of enzymes, receptors and transporters. This course will give students a strong biochemical understanding of this important interfacial application of biochemistry to real life issues especially of interest to high school students.

Since this is a 3 credit hour course, you should expect to spend about 120-150 total hours engaged in ‘work’ for this course. This is about 15-20 hours per week for an 8 week course.

### **Student Outcomes:**

This course seeks to provide approaches to some of the following problems:

1. What is our current best understanding of how to read peer reviewed literature in biochemistry, nutrition, and sports medicine and critically evaluate this literature?
2. How can we critically analyze publications (not peer reviewed) for their scientific validity?
3. What role/roles do companies that sell over-the counter products for their (perceived) nutritional and/or exercise benefits play in informing the public (i.e. high school students) about the value of their product. Can we do a cost/benefit analysis for such products?
4. How can we extend this understanding in the classroom for real world problems (especially of interest to high school students) involving nutrition, exercise, and sports.
5. We will also examine why this important intersection of biochemistry, nutrition, and sports medicine is quite open to charlatan type problems.

#### **Required Student Tasks/Assignments:**

1. Read the assigned readings (the biochemistry content and the specific papers in the selected areas) and answer the assigned questions; during the 8 weeks, 6 papers, selected from the literature, will be assigned. For each assigned reading, be sure to include an 'extension' of the topic that you could use in your own classroom (either as a discussion activity or a research activity). Graduate students will have approximately 25% more questions to answer than undergraduates.
2. Engage in the on-line peer class discussions; we will use these discussions for class members to have a chance to ask each other questions about the topic (and theme) of the selected papers prior to writing up their answers. As your instructor, I will follow along and participate when I feel that I can contribute to the discussion. [Hopefully this will be useful since I have selected some fairly technical papers for us to read and evaluate]. These discussions will take place using the 'FORUM' function in ReggieNet and I look forward to your professional exchanges. The first time you engage in the FORUM discussions, please indicate your name and the school and city where you teach.
3. Each assignment will be assigned a 'due date' after which the assignment will be considered late and assessed a 10% point penalty per each 24 hour period. All assignments (which are individual assignments) should be submitted using email. Please submit your assignments using "Word" so it will be easier for me to give each individual assignment feedback; I can do this using the 'tracking' mode.

4. Extensive use of Milner Library (at ISU: <https://library.illinoisstate.edu/services>) as well as on-line sources (including SciFinder, ChemSpider, Goggle Scholar, PubMed, and others) will be valuable as you carry out these assignments. Please let me know asap if you need assistance with searching for materials not provided by me.

#### General Topical List:

1. Exercise and Functional Foods (extension: involving decisions on 'good' diet)
2. Hydration (extension: specialty drinks)
3. Endurance (extension: diet supplements)
4. Prevention of Fatigue and Injury (extension: role of reactive oxygen species)
5. Role of our microbiome (extension: role of diet and exercise)
6. Body weight (extension: what % fat, protein, and water is 'good')
7. Roles of sports and diet in high school and society

#### Grading Scale:

Grades in the course are based upon timely completion of each assignment and thoughtful analysis (critical analysis) of the strength of the papers selected for the reading. For the final term paper, the careful selection and analysis of selected literature will be important.

A 90-100 %

B 80-89%

C 70-79%

Point Distribution: total points = 500

Critical analysis of assigned literature reading: 6 assignments x 50 points each = 300 points

Final Term Paper: 200 points