

# CHM/BSC 365 101

## Introductory Biochemistry

### Class Information

**Time:** Mon, Weds, Fri, 10:00am – 10:50am

**Location:** 465 Science Building

### Instructor Information

**Instructor:** John Rakus, Ph.D. **Email:** [rakus@marshall.edu](mailto:rakus@marshall.edu) **Phone:** 304-696-6627

**Office:** 478 Science Building **Website:** <http://muwww-new.marshall.edu/muonline/>

**Office Hours:** Mon, Tues, Weds, Thurs, 2:00pm – 4:00pm. Also walk-in when available and by appointment.

**Text:** Mathews *et al.*, Biochemistry, 4<sup>th</sup> Ed., Pearson Higher Education

**Additional:** scientific calculator

### Catalog Listing

A survey course including introduction to basic biochemical concepts, metabolic pathways, and bioenergetics.

### Course Description

This is an upper division course with the goal of providing a foundational basis on the chemical principles that underlie biological systems. From this course, students will understand how chemistry governs the myriad interactions in a living organism. Though no experience in biology is required, it is highly recommended. Organic chemistry is a requirement of this course.

**Prerequisites (BSC 365):** BSC 121 (C or above) and CHM 356

**Prerequisites (CHM 365):** CHM 327 (C or above) or CHM 356 (C or above)

### Learning Objectives

1. Develop a basic familiarity with biomolecules, biopolymers, and their interactions with each other in a living organism.
2. Apply basic fundamental concepts from organic chemistry to a complex biological organism.
3. Recognition of how organisms derive energy from food source molecules.

### Student Conduct

I hold my students to the same expectations about conduct and behavior while in class that I have for myself. It is my responsibility to you to provide the best learning environment of which I am capable and, in return, I believe everyone in this classroom is an adult who has the right to be treated with dignity and respect. I encourage questions, interaction and curiosity but I also implore you to consider your classmates' interests in class. I will not demand your unwavering attention if you do not wish to provide it, but I simply ask that you do not disrupt the learning environment in which I am trying to provide.

### Technology Policy

Cell phones, iPads and other digital devices are allowed during lecture time provided that they are kept silent and are not used in a disruptive manner. Should I feel that someone is using a device disruptively, I reserve the right to confiscate the device for the remainder of class and/or ask the student to leave. Devices are expressly forbidden during examinations and will be considered a violation of the Academic Integrity Policy.

### Attendance Policy

Attendance is strongly encouraged. I will not keep attendance (beyond registration requirements) and attendance is not graded. However, Friday group assignments are required to be turned in on the day of class and cannot be made up.

### University Policies

By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to [http://www.marshall.edu/academic-affairs/?page\\_id=802](http://www.marshall.edu/academic-affairs/?page_id=802)

Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

### Grade Policy

You will have two in-class exams held on September 30 and October 30. I will not be present for the September 30 exam but one of my colleagues will be present to proctor it. The lecture before each test will be used as a review session and the exams will be minimally comprehensive. In addition, you will be required to complete 11 online quizzes through Blackboard. The lowest quiz grade will be dropped. Though I do not require attendance, I will expect in class participation through class questions and group activities. The Friday group work assignments are mandatory and must be turned in by the end of that class period.

#### **Letter Grade Assignments**

90-100	A
80-89	B
70-79	C
60-69	D
00-59	F

#### **Grade Breakdown**

Exam 1 (Sept 30)	<b>20%</b>
Exam 2 (Oct 30)	<b>20%</b>
Online Quizzes	<b>15%</b>
In Class Responses	<b>15%</b>
Final (Dec 9)	<b>30%</b>

### Loose Schedule of Course Topics

#### **August 26 – August 31**

Introduction to course and course policies. Definition of biochemistry (Chapter 1). Water as the biological solvent (Chapter 2).

#### **September 2 – September 6**

Bioenergetics, free energy and equilibrium, biological energy sources and redox reactions (Chapter 3).

**NO CLASS – September 2, Labor Day**

**QUIZ 1 – September 2**

**“W” PERIOD BEGINS – September 3**

**September 9 – September 13**

Protein structure. Amino acid structure and characteristics. (Chapter 4). Protein primary and secondary structure (Chapter 5).

**QUIZ 2 – September 9**

**September 16 – September 21**

Protein tertiary and quaternary structure. Methods for isolating and studying proteins (Chapter 6). Kinetics of protein/ligand binding (Chapter 7).

**QUIZ 3 – September 16**

**ENROLLMENT VERIFICATION – September 16**

**September 23 – September 27**

Regulation of protein/ligand binding (Ch. 7 cont.). Kinetics of enzyme-catalyzed reactions (Chapter 11)

**QUIZ 4 – September 23**

**EXAM 1 REVIEW – September 27**

**September 30 – October 4**

Regulation of enzyme-catalyzed reactions (Ch. 11 cont.). Metabolism overview (Chapter 12).

**EXAM 1 – September 30**

**October 7 – October 11**

Glycolysis, gluconeogenesis and metabolic regulation (Chapter 13).

**QUIZ 5 – October 7**

**October 14 – October 18**

Citric Acid Cycle (Chapter 14), catalysis special topics: acetoacetate decarboxylase.

**QUIZ 6 – October 14**

**October 21 – October 25**

Electron transport and oxidative phosphorylation (Chapter 15).

**QUIZ 7 – October 21**

**October 28 – November 1**

Introduction to photosynthesis (Chapter 16).

**EXAM 2 REVIEW – October 28**

**EXAM 2 – October 30**

**“W” PERIOD ENDS – November 1**

**November 4 – November 8**

Photosynthesis continued, CO<sub>2</sub> fixation and carbohydrate biosynthesis (Chapter 16).

**QUIZ 8 – November 4**

**November 11 – November 15**

Carbohydrate functions (Chapter 9). Carbohydrate special topics: viral glycobiology.  
Introduction to nucleic acids (Chapter 4).

**QUIZ 9 – November 11**

**November 18 – November 22**

Nucleic acids special topics: the human genome project. Introduction to lipids (Chapter 10).

**QUIZ 10 – November 18**

**November 25 – November 29**

**NO CLASS – Thanksgiving Break**

**December 2 – December 6**

Membrane transport (Ch. 10 cont.). Basics of lipid metabolism (Chapter 17, Chapter 19).

Lipid special topics: polyketide natural products.

**QUIZ 11 – December 2**

**FINAL REVIEW – December 6**

**December 9**

FINAL EXAMINATION: 10:15am – 12:15pm