

**Syllabus**  
**BIO 205 – Fundamentals of Biochemistry**  
**Fall 2017**

**Lecture times:** MWF 11:00 - 11:50 AM  
**Location:** Cooke 121  
**Instructor:** Dr. Lara Hutson  
**Office:** Cooke 317  
**Email:** larahuts@buffalo.edu  
**Office Hours:** Fridays 12:30-1:30 PM

**GENERAL INFORMATION**

This course covers the chemical foundations of biology, including structure and function of proteins, sugars, nucleic acids, and lipids, as well as metabolism. *Prerequisite: 1 semester Organic Chemistry.* Grades will be based on Homework assignments and Exams. Exam dates can be found in the Lecture Schedule and in the calendar at the end of this document; Homework due dates are listed under “Homework” and in the calendar at the end of this document.

**COURSE MATERIALS (REQUIRED)**

1. “BIO 205 Custom Course Pack” available at the UB Bookstore (~\$102). Includes:
  - Textbook: Fundamentals of Biochemistry by G. Snyder
  - WebAssign passcard with personal access code

*If you obtain a used copy of the textbook, you must purchase stand-alone WebAssign access (~\$46).*

2. PollQ registration: PollQ is a bot that uses Facebook Messenger for in-class question-and-answer. Information about how to register will be provided during the first week of classes.

**TA'S**

- There are two lecture TA's for this class. They will each hold one hour of office hours per week. Times and days will be posted in UB learns.
  - Hannah Calkins: hrcalkin@buffalo.edu
  - Andre Ho: andreho@buffalo.edu

**COMMUNICATION AND GENERAL INFORMATION**

- **UB Learns:** The Syllabus, instructions for registering for WebAssign, and Exam scores are posted in UB learns. All important announcements will also be posted to UB learns, so check these regularly!
- **Syllabus:** Read this carefully and completely! Print it out and keep it handy, particularly the 2-page BIO 205 Course Schedule near the end.
- **Email:** I may use email to communicate important information regarding the course. All emails will be sent to your buffalo.edu email account. You are required to use this account or forward mail from it to your preferred account. You must check regularly for emails in order to receive information relevant to the course.

## COMPUTERS

All students must have and be able to use the following:

1. Microsoft Word
2. Adobe reader for reading PDF files
3. Internet access to sites such as UB Learns and WebAssign.
4. The latest version of Java is strongly recommended.

## EXAMS (500 POINTS\*):

Exam dates:

Exam	Date	Coverage	Pts*
Exam 1	Monday, September 18	Topics 1-7	100
Exam 2	Monday, October 9	Topics 8, 10-15	100
Exam 3	Monday, October 30	Topics 16-22	100
Exam 4	Wednesday, November 15	Topics 23-28	100
Exam 5	Friday, December 8	Topics 29, 31-34, 36	100
Final Exam	Wednesday, December 13	Cumulative	100

\*Lowest exam score dropped in determination of your final grade.

- **Exam format:**
  - Approx. 70% multiple choice (similar to multiple choice homework)
  - Approx. 30% handwritten short answers (similar to drawing homework)
- **Location:** Exams 1-5 will be held in class. The final exam is during finals week, Wednesday, Dec. 13, 3:30-5:00 PM in NSC 201.
- **Grades:** An approximate letter grade for each exam can be determined from “% Score Correspondence...” under “Grades” below. The lowest exam score will be dropped in the determination of your final course grade.
- **Make-ups:** If you know in advance that you will miss an exam, you must contact me *a minimum of two weeks* prior to the exam and provide written confirmation of the reason for your planned absence (including for varsity athletic events, religious obligations, etc.). If you miss an exam due to a medical emergency, you must contact me within 24 hrs of the exam. You may receive a make-up exam if you provide me with official documentation explaining your absence (e.g. hospital discharge papers). Unexcused absences will result in a grade of 0. **ABSOLUTELY NO MAKE-UP EXAMS WILL BE ADMINISTERED WITHOUT DOCUMENTATION.**
- **Errors/appeals:** Grades will be posted to UB learns as soon as they are available. Soon after, exams will be scanned and made available for you to pick up. If you believe there is an error in your score, you must pick up your exam, check your answers against the KEY, and contact me by email or during office hours explaining the SPECIFIC nature of the error. If you follow these instructions, I will make every effort to address it. Anyone who is found to have altered their exam in order to receive a higher grade **WILL AUTOMATICALLY RECEIVE AN F IN THE COURSE** (for more information, see Academic Dishonesty below).

## **HOMEWORK (144 POINTS TOTAL):**

There are 2 types of graded homework, both of which must be submitted through WebAssign. Instructions for registering for WebAssign can be found in the “Tutorials” content area of our UB learns course site in the “Tutorial 01...” document. WebAssign class key: **buffalo 1343 8042**. Please use your UB email address and first and last names as they are listed in HUB to ensure that you receive credit for submitted homeworks.

Tutorials for completing the two types of graded homework assignments are posted in the Resources section of WebAssign for this course.

Almost all homework assignments are due on Sundays. All homework due dates are given in the course schedule at the end of this syllabus. All Homework must be submitted by 11:00 PM on the

- **Multiple Choice Homework (90 points):**

- Multiple choice questions: credit for all questions answered correctly by 2nd attempt
- 33 assignments, each worth 3 pts, and the lowest 3 scores are dropped in calculating your final grade (Lectures 1-36, not including 9, 30, or 35)
- For more information, see Tutorial 02 in the Resources section of WebAssign.

- **Drawing Homework (54 pts):**

- There are 11 Drawing assignments beginning with Lecture 1, each worth 6 pts, with the lowest 2 scores dropped in calculating your final grade. There is a Drawing tutorial in WebAssign at the beginning of the course (Draw 00) for you to practice. This does not contribute to your final grade.
- For more information, see Tutorial 03 in WebAssign Resources

- **Short Answer Homework (ungraded):**

- Short answer questions are provided at the end of each chapter of the textbook. It is STRONGLY recommended that you do these and check your work, as there are always similar questions on the exams. Partial answer keys will be posted in Course Documents in UB learns.

## **GRADES**

Scores are determined from exams and homework grades as follows. These assignments are explained in detail in the next few pages.

<b>Assignment</b>	<b>Points</b>
Exams (6, drop lowest = 5 x 100 pts)	500 pts
Homework: - Multiple choice (33, drop lowest 3 = 30 x 3 pts = 90 pts) - Drawing assignments (11, drop lowest 2 = 9 x 6 pts = 54 pts)	144 pts
<b>Total</b>	<b>644 pts</b>

## **% SCORE CORRESPONDENCE TO LETTER GRADES IN BIO 205:**

<u>Range</u>	<u>Grade</u>	<u>Range</u>	<u>Grade</u>	<u>Range</u>	<u>Grade</u>
100-92.0	A	79.9-76.0	B-	63.9-60.0	D+
91.9-88.0	A-	75.9-72.0	C+	59.9-56.0	D
87.9-84.0	B+	71.9-68.0	C	51.9- 0.0	F
83.9-80.0	B	67.9-64.0	C-		

There is NO CURVE and NO EXTRA CREDIT in this class with the exception of PollQ. If your final % score is between two of the above cut-offs, you will receive the *higher* of the two grades (e.g. if you have a 75.91, you will receive a B-).

### **INCOMPLETES**

Incompletes will only be received by students in good standing (not failing) who have an excused absence from one or more aspects of the course and a good reason for not being able to complete the course. These students will be given an incomplete and must complete the course within the next year. Arrangements to receive an incomplete must be made before the end of the semester. For more information, refer to the University Policy on Incompletes at <https://catalog.buffalo.edu/policies/explanation.html>.

### **ACCESSIBILITY**

If you have any type of disability and require accommodations to enable you to participate in this course, please contact the [Office of Accessibility Resources](#) (60 Capen Hall) during the first week of classes. They will provide you with information, review appropriate arrangements, and provide you with a letter explaining any necessary accommodations. Provide me with a copy of this letter, and, if necessary, schedule your exams at the Office of Accessibility Resources so that your exam overlaps significantly with the scheduled exam in class. If this is not possible, or you have questions about this, you must come to see me outside of class.

### **ACADEMIC DISHONESTY**

CHEATING OR ANY OTHER FORM OF ACADEMIC DISHONESTY WILL RESULT IN AUTOMATIC FAILURE IN THE COURSE. For more information on UB's academic integrity policy, see UB's Academic Integrity Policy at <https://catalog.buffalo.edu/policies/integrity.html>.

### **IMPORTANT DATES (ALSO SEE [HTTP://CALENDAR.REGISTRAR.BUFFALO.EDU/CALENDAR/](http://calendar.registrar.buffalo.edu/calendar/))**

- Sept. 5: Last day to drop course without "R" on transcript
- Nov. 10: Last day to resign (R will appear on transcript)
- Nov. 22-25: Fall recess
- Dec. 8: Last day of classes

### BIO 205 Course Schedule – Fall 2017

Week	Day	Date	Chapter: Lecture Topic (Chapters refer to textbook by Snyder)
<i>I. Chemistry foundations</i>			
1	M	8/28	1: Introduction to biomolecules
	W	8/30	1: Biomolecules (cont.)
	F	9/1	2: Stereochemistry
<b>Homework</b>	<b>Sun</b>	<b>9/3</b>	<b>Lecture 1, 2</b>
2	M	9/4	LABOR DAY - NO CLASS
	W	9/6	3: Weak acids and bases
	F	9/8	4: Thermodynamics
<b>Homework</b>	<b>Sun</b>	<b>9/10</b>	<b>Lecture 3, 4; Draw 01, 02</b>
3	M	9/11	5: Polar and non-polar molecules
	W	9/13	6: Kinetics and Equilibrium
	F	9/15	7: Redox & REVIEW
<b>Homework</b>	<b>Sun</b>	<b>9/17</b>	<b>Lecture 05, 06, 07; Draw 03</b>
4	<b>M</b>	<b>9/18</b>	<b>EXAM 1 - Chapters 1-7</b>
<i>II. Structure/Function of proteins</i>			
4	W	9/20	8: Amino acids
	F	9/22	10: Protein folding - helices
<b>Homework</b>	<b>Sun</b>	<b>9/24</b>	<b>Lecture 08, 10; Draw 04</b>
5	M	9/25	11: Protein folding - sheets
	W	9/27	12: Hemoglobin - positive cooperativity; pH
	F	9/29	13: Hemoglobin - DPG/BPG, mutations; Enzyme mechanisms
<b>Homework</b>	<b>Sun</b>	<b>10/1</b>	<b>Lecture 11, 12, 13</b>
6	M	10/2	14: Enzyme mechanisms and regulation
	W	10/4	15: Enzyme kinetics
	F	10/6	REVIEW
<b>Homework</b>	<b>Sun</b>	<b>10/8</b>	<b>Lecture 14, 15; Draw 05</b>
7	<b>M</b>	<b>10/9</b>	<b>EXAM 2 - Chapters 8, 10-15</b>
<i>III. Sugars, Nucleic acids, and Lipids</i>			
7	W	10/11	16: Monosaccharides
	F	10/13	17: Polysaccharides
<b>Homework</b>	<b>Sun</b>	<b>10/15</b>	<b>Lecture 16, 17; Draw 06</b>
8	M	10/16	18: Nucleic acid monomers
	W	10/18	19: Polynucleotides
	F	10/20	20: DNA-protein relationships
<b>Homework</b>	<b>Sun</b>	<b>10/22</b>	<b>Lecture 18, 19, 20</b>
9	M	10/23	21: Fatty acid-based lipids
	W	10/25	22: Isoprenes
	F	10/27	REVIEW
<b>Homework</b>	<b>Sun</b>	<b>10/29</b>	<b>Lecture 21, 22; Draw 07</b>
10	<b>M</b>	<b>10/30</b>	<b>EXAM 3 - Chapters 16-22</b>

<i>IV. Metabolism: Glycogen --&gt; Glucose --&gt; Pyruvate</i>			
10	W	11/1	23: Introduction to metabolism
	F	11/3	24: Glycolysis - 10 steps
<b>Homework</b>	<b>Sun</b>	<b>11/5</b>	<b>Lecture 23, 24; Draw 08</b>
11	M	11/6	25: Glycolysis - energetics and 26: Gluconeogenesis
	W	11/8	26 cont. and 27: G6P fates: F6P, ribose, glycogen
	F	11/10	27 cont. and 28: Hormone regulation
<b>Homework</b>	<b>Sun</b>	<b>11/12</b>	<b>Lecture 25, 26, 27; Draw 09</b>
12	M	11/13	28 cont. and <i>REVIEW</i>
<b>Homework</b>	<b>Tues</b>	<b>11/14</b>	<b>Lecture 28</b>
12	<b>W</b>	<b>11/15</b>	<b>EXAM 4 - Chapters 23-28</b>
	F	11/17	29: Tissue differences
<b>Homework</b>	<b>Sun</b>	<b>11/19</b>	<b>Lecture 29</b>
<i>V. Metabolism: Pyruvate --&gt; ATP, Lipids</i>			
13	M	11/20	31: Pyruvate fates
	W-F	11/22-25	<i>HAPPY THANKSGIVING!</i>
<b>Homework</b>	<b>Sun</b>	<b>11/26</b>	<b>Lecture 31; Draw 11</b>
14	M	11/27	32: TCA (Krebs) Cycle
	W	11/29	33: Electron transport and ATP synthesis
	F	12/1	34: Fatty acid metabolism
<b>Homework</b>	<b>Sun</b>	<b>12/3</b>	<b>Lecture 32, 33, 34; Draw 12</b>
15	M	12/4	36: Interconversions between sugars and fat
	W	12/6	<i>REVIEW</i>
<b>Homework</b>	<b>Thurs</b>	<b>12/7</b>	<b>Lecture 36</b>
15	<b>F</b>	<b>12/8</b>	<b>EXAM 5 - Chapters 29, 31-34, 36</b>
<b>FINAL EXAM - TOPIC 36 + CUMULATIVE: 3:30-5:00 PM WEDNESDAY, DEC. 13, NSC 201</b>			

**BIO 205 LEARNING OUTCOMES**

Number	Program learning outcome	Depth	Specific outcome objectives for BIO 205	Assessment tool
1	Provide Breadth of knowledge of basic principles and concepts	2	Review principles of organic and general chemistry and link them to biological examples	Exam 1; HW 1-7
			Review or learn hierarchy of biological macromolecule structure (monomers -> polymers -> higher-order structure)	Exam 2; HW 8, 10, 11
			Consider evolution from standpoint of protein sequences	Exam 2; HW 9
			Review or overview of catabolism vs. anabolism	Exam 4; HW 23-28
2	Provide depth within specialized areas	2	Learn how structure leads to function for proteins, carbohydrates, nucleic acids, and lipids	Exam 3; HW 16-22
			Mechanical, chemical, and thermodynamic consequences of protein structure and function for Hemoglobin, Enzymes	Exam 2; HW 12-15
			Understand chemical and thermodynamic principles of metabolism	Exam 4; HW 23-28
3	Provide an understanding of experimental design and methodology	1	Learn about Edman degradation and proteolysis (protein sequencing), column chromatography (purification of organic molecules), high-pressure liquid chromatography characterization of amino acids), SDS-polyacrylamide gel electrophoresis (analyzing differences in membrane protein composition)	Exams 1, 2 & 3; HW 6, 9, 21
4	Develop approaches for integration of information	1	Integrate physiology, cell biology, and biochemistry, in particular (digestion, hormone signaling)	Exams 2, 4, & 5; HW 14, 27-29
5	Encourage critical thinking and hypothesis building	1	Develop enhanced critical thinking skills using modeling software to render, manipulate, and analyze biological macromolecules	Modeling HW 1-9
			Interpret hemoglobin oxygen-binding curves; predict consequences of CO poisoning, high altitude, mutations; Analyze and interpret enzyme kinetics data; predict effects of exercise, fasting, diabetes, drugs on metabolism	Exams 2, 4, & 5; HW 12-15, 28-34
			Describe applications of hemoglobin structure/function, carbohydrate structure, and metabolism	In-class quizlets; review before exam
6	Provide skills in scientific communication	N/A	N/A	N/A
7	Provide contemporary information	1	Learn applications of biochemistry to methemoglobinemia, carbon monoxide poisoning, and other hemoglobin-related diseases; Atkin's diet	Exams 2 and 5; HW 12-13 and 36
8	Encourage appreciation of scientific values	1	Understand data and data interpretation	