

**BIOL 380    BIOCHEMISTRY I - Fall 2020**  
**Tue/Thu 8:00-9:15 AM (PST); W 5:30-6:20 PM (PST)**

*In-class Face-to-Face meetings will be in the INTL Ballroom (Pitman Center)*

*Online lectures will be "Zoomed" live and should be available later via MS Stream*

**380-01: Hyflex** section of BIOL 380. This section of the course offers both in-class Face-to-Face (F2F) and online "Zoomed" lectures. Because the course was recently moved to the newly staged International Ballroom (Pitman Center), there is more than enough space (~200 desks) for all students to attend the F2F lectures. F2F students are welcome to use their own laptop computers to take notes or to follow along on Zoom (with the sound muted in the classroom, please). Attendance at the F2F or Zoom lectures will not be monitored and will not be required.

**380-02: Online** section of BIOL 380. This section is designed for all students planning to take the course entirely off-campus. The lectures will be "Zoomed" live and the recorded lecture will be available later via streaming. Attendance at the live Zoom lectures will not be monitored or required.

**Course Topics:** BIOL 380 serves as an introduction to the structure, function, and metabolism of major biomolecules of living systems. Emphasis will be given to:

- Protein structure & enzyme function
- Bioenergetics ranging from single reactions to metabolic pathways
- Carbohydrate metabolism with the complete conversion of glucose to CO<sub>2</sub> & energy
- Brief treatments of nucleic acid structure, fatty acid metabolism & photosynthesis

**Learning Outcomes:** In accordance with UI Learning Outcomes, it is expected that students will:

- **Learn & Integrate:** Students will apply their previous knowledge of chemistry to biology to gain a basic understanding and enhance future learning of the molecular basis of life.
- **Think & Create:** Students will be expected to apply the concepts and approaches learned here to solve future academic and professional problems.
- **Communicate:** Students will be expected to better communicate with others using the combined languages of chemistry and biology.
- **Clarify Purpose & Perspective:** It is expected that all students will gain important insights into the chemistry that allows them to exist, read and then contemplate this sentence.
- **Practice Citizenship:** It is expected that every student will share their knowledge as the general public is ill-informed on many relevant topics like gene therapy or the mechanism of drug action.

**Text:** Nelson & Cox. 2017. Lehninger Principles of Biochemistry, 7<sup>th</sup> Ed. An electronic version of the 7<sup>th</sup> Ed comes with the Sapling Plus that is required for homework assignments. A loose leaf version of the text is bundled with Sapling Plus (Vandal Store). Alternatively, the 6<sup>th</sup> and 5<sup>th</sup> editions are excellent resources (a reading list can be provided).

**Lecture Notes:** log on to UI BbLearn to access notes and other materials (e.g. old exams and practice problems). You are responsible for downloading your own notes. Annotated notes will be posted following each lecture.

**Grading:** Grades will be based primarily on 4 subject exams and weekly homework assignments. Homework assignments and the eBook (7<sup>th</sup> Ed) are accessed through Sapling Learning (<http://www.saplinglearning.com/login>) which requires a one-time fee.

The 4<sup>th</sup> subject exam will be given during finals week at 8:00 - 10:00 AM (PST), Thu, Dec 17. The lowest subject exam score will be dropped; this means that a student could choose not to take a subject exam (1 thru 4). Grading of subject exams 1-3 should be contested within a week following return of the exams to students.

**There will be no extra credit assignments!**

1) Scores on the three best subject exams will be combined for a total of: **200 x 3 = 600 pts**

- 2) Scores on the homework will be combined for a total of: **100 pts** (~14% of total pts)  
In order to receive the full 100 pts for HWK, your total effort must average 80.0% over the semester.
- 4) Grades will be based on the percentage of maximum total points (**700**). Because some or all of each student's exams will be taken online, final grades will be determined as a function of the class performance. Also be aware that the F2F and online exams will be quite different with the online exams having more essay questions in place of multiple choice questions. The letter grade cutoffs (as a percentage of the total 700 pt) will announced following Fall Recess for both the F2F section and the online section of the course; this will help students decide whether or not to take the 4<sup>th</sup> and final exam (Dec 17).

**Make-up Examinations:** Make-up examinations will be given only for a valid reason (COVID-19 quarantine/isolation, hospital stay (for any reason) or serious family emergency) or by prior arrangement because of necessary obligations and responsibilities to the University of Idaho (field trips, UI sports, or attendance at professional meetings). These missed exams must be made up within a timely manner; it is the responsibility of each student to promptly contact the Instructor to make arrangements. Multiple exams on one day are not a valid excuse for rearranging exam dates; an exception is made for 3 or more final exams on a single day.

**Academic Integrity:** Any cases of cheating, giving or receiving assistance during an exam, plagiarism, falsification of records, or similar behavior will be handled according to the Student Code of Conduct, (<http://www.webpages.uidaho.edu/fsh/2300.html>; Chapter 2 of the Faculty Staff Handbook; updated 2014). F2F exams will be proctored by the instructor and, if necessary, assistants; alternative exam locations (*i.e.* CDAR or other proctored sites) need to be arranged in advance of the exam day. Please bring student or driver's photo ID to each exam.

Do not wear a hat on exam day unless you wish to sit in the front row. Hats without brims or baseball caps worn backwards are acceptable. No personal listening devices during exams. And please, **no programmable calculators**.

**International Ballroom (Pitman Center):** *for students planning to attend F2F lectures*

This space has recently been converted to a very large classroom space with ~200 desks that are spaced appropriately to observe social distancing. Even with the distancing, masks will still be required in this space.

- **Advice #1:** Due to the layout, the desks in the back half of the room are so far away from the screen that it will likely be difficult to see the projected lecture notes. You are advised to sit closer to the front and/or use a laptop with Zoom to simultaneously follow what is on the screen.
- **Advice #2:** Enter the Ballroom "class" using the main doors (South side of the Ballroom). To avoid mixing with incoming students of the next class, all students (and Instructors) will exit through the marked doors in the front of the classroom.
- **Advice #3:** For the Tue/Thu morning lectures, we are the first class of the day and the room should have been thoroughly cleaned overnight. Still, if you would like to wipe down your desk top (or other parts) feel free to wet some paper towel with disinfectant prior to entering the room; the disinfectant station should be close to the entrance doors. Please do not bring the bottle of disinfectant to your desk.

## **Healthy Vandal Pledge**

### **POLICIES FOR HEALTHY VANDALS**

It is a longstanding tradition that Vandals take care of Vandals, and we all do our best to look out for the Vandal Family. The simple precautions listed below go a long way in reducing the impact of coronavirus on our campuses and in our communities. With everyone engaging in these small actions, we can continue to participate in our vibrant campus culture where we are able to learn, live, and grow. Visit [U of I's COVID-19 page](#) often for updated information. Questions related to U of I's coronavirus response can be sent to [covid19questions@uidaho.edu](mailto:covid19questions@uidaho.edu).

### **IN-PERSON CLASS ATTENDANCE**

Refrain from attending class in-person if you are ill, if you are experiencing any of the [known symptoms of coronavirus](#), or if you have tested positive for COVID-19 or been potentially exposed to someone with COVID-19.

- If you display symptoms and/or test positive, you should quarantine following the [CDC's recommendations](#). Do not return to class until you meet the [CDC's requirements](#).
- If you have been exposed but are asymptomatic, you should stay home for 14 days from the last exposure if you remain asymptomatic, adhering to the [CDC's requirements](#).

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Documentation (*a doctor's note*) for medical excuses is not required; instead, email me to make arrangements to submit any missed work and make plans to use Zoom and/or online course materials to stay current with the course schedule.

### **FACE COVERING REQUIREMENTS**

All faculty, staff, students and visitors across all U of I locations must use face coverings over the nose and mouth whenever in any U of I buildings. **Thus, you are required to wear a face covering in this classroom at all times.**

- If you have a medical condition that affects your ability to comply with the face covering policy, please contact the [Center for Disability Access and Resources \(CDAR\)](#) to request a reasonable accommodation.
  - If you have other reasons you believe make you exempt from wearing face coverings, please contact the [COVID-19 Coordinator](#).
  - Failure to wear a face covering over your nose and mouth will require you to leave the classroom immediately. If a disruption to the learning experience occurs due to repeated offence and/or egregious behavior, you will be reported to the [Dean of Students Office](#) for a potential code violation.
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## University of Idaho Classroom Learning Civility Clause

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (5-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (5-4285).

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## UI Center for Disability Access & Resources (CDAR) Reasonable Accommodations Statement

*Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through the Center for Disability Access and Resources located in the Bruce M. Pitman Center, Suite 127 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course.*

- 885-6307
- email: [cdar@uidaho.edu](mailto:cdar@uidaho.edu)
- web: [www.uidaho.edu/current-students/cdar](http://www.uidaho.edu/current-students/cdar)

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## University of Idaho Concealed Firearms Policy

*From the Office of General Counsel: "The University of Idaho bans firearms from its property with only limited exceptions. One exception applies to persons who hold a valid Idaho enhanced concealed carry license, provided those firearms remain concealed at all times. If an enhanced concealed carry license holder's firearm is displayed, other than in necessary self-defense, it is a violation of University policy. Please contact local law enforcement (call 911) to report firearms on University property."*

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BIOL 380 - BIOCHEMISTRY I - FALL 2020

Tue/Thu 8:00-9:15 AM (Intl Ballroom, Pitman Center) & Wed 5:30-6:20 PM (Intl Ballroom)

Instructor: Doug Cole, 131 Gibb Hall; 885-4071; [dcole@uidaho.edu](mailto:dcole@uidaho.edu) (I will try to respond within 24 hr)

Instructor Zoom Office Hours: Wed 8:00-10:00 AM (Drop-In Zoom) or by arrangement; initially there will be no F2F office hr

Textbook: Nelson & Cox, Lehninger Principles of Biochemistry, 7<sup>th</sup> Ed, 2017; the eBook is included with SaplingPlus

Online Homework: SaplingPlus is at Sapling Learning <http://www2.saplinglearning.com/>; choose the Fall 2020 version of BIOL 380

Class Web Address: UI Blackboard Learn: <https://bblearn.uidaho.edu/webapps/login/>

Each student is responsible for downloading and/or printing their own lecture notes for the Tue/Wed/Thu lectures!

All lectures will be recorded using Zoom and then be available to all students soon after via MS Stream

*Tentative Lecture/Exam Schedule - for Tue/Thu 8:00-9:15 AM*

Date		Topic	Reading (7 <sup>th</sup> Ed)	Other
Aug 25	T	I. Discuss Syllabus (BbLearn)		
		II. Self Study: Cell Architecture & Organic Chemistry	pg 1-21	O-Chem Text
		III. Acid-Base Chemistry (calculations will continue on Wed, Aug 26)	pg 58-69	
27	R	I. Chemical Bonding; II. Properties of H <sub>2</sub> O	pg 47-58	
Sept 01	T	From DNA to Protein - Replication, Transcription & Translation	pg 279-303	
03	R	Amino Acids & Peptides	pg 75-89,96-108,115-119	
Sept 08	T	Electrophoresis of Proteins & Nucleic Acids	pg 92-96	
10	R	Levels of Protein Structure - example: Myoglobin	pg 115-127,132-133	
15	T	Allosteric Protein Function: Hemoglobin vs Myoglobin	pg 157-174	
17	R	<i>EXAM I (self-study through levels of protein structure)</i>		
22	T	Perturbations in Structure: Death & Disease by Misfolding		
24	R	Introduction to Enzymes & Kinetics	pg 187-196	
29	T	Enzyme Kinetics I	pg 198-213	
Oct 03	R	Enzyme Kinetics II	pg 198-213	
06	T	Catalysis I	pg 213-236	
08	R	Catalysis II	pg 213-236	
13	T	Cytoskeleton & Molecular Motors	pg 7-9,179-183	
15	R	Carbohydrates	pg 241-260	

Date		Topic	Reading (7 <sup>th</sup> Ed)	Other
Oct 20	T	I. Metabolism Overview; II. Intro to Glycolysis	pg 491-527, 533-548	
22	R	<i>EXAM II (allosteric protein function through molecular motors)</i>		
Oct 27	T	Glycolysis - Enzymes, Thermodynamics & Regulation	pg 533-548	
29	R	I. Gluconeogenesis; II. Intro to Glycogen	pg 558-564, 601-614	
Nov 03	T	Glycogen - Metabolism & Hormonal Regulation	pg 601-614	
05	R	Citric Acid Cycle - Harvesting High Energy Electrons	pg 619-642	
10	T	Electron Transport (ETS) - Electrons, Electrons, Electrons	pg 711-728	
12	R	Oxidative Phosphorylation - Protons, Protons, Protons	pg 728-744	
17	T	<i>Catch-up day {to make up for lost time due to Instructor rambling}</i>		
19	R	<i>EXAM III (carbohydrates through citric acid cycle)</i>		
Nov 23-27		<i>FALL RECESS</i>		
<i>All classes for all students will be fully online (Zoom &amp; MS Streaming) following Fall Recess</i>				
Dec 01	T	Lipids I - Nomenclature & Catabolism of Fatty Acids	pg 361-366, 649-670	
03	R	Lipids II - Fatty Acid Anabolism	pg 811-821	
Dec 08	T	Photosynthesis - Tripping the Light Fantastic	pg 755-776	
10	R	<i>Catch-up or to be determined</i>		
<b>FINALS WEEK</b>				
Dec 17	R	<u>Thursday (8:00-10:00 AM) Exam IV (ETS thru Photosynthesis)</u>		

WEDNESDAY EXTRA HOUR - EXPECTED LECTURE & HOMEWORK SCHEDULE - for Wed 5:30-6:20 PM (INTL Ballroom)

Home work Assignments are accessed at Sapling Learning; register at <http://www2.saplinglearning.com/>

Week	Date	Lecture Topic	Graded Homework Assignment	Expected Due Date (5:30 PM)*
1	Aug 26	Intro to Wed Hr; Acid/Base Calc.	#1A & 1B Self Study; Molarity; Acid/Base	Sept 02
2	Sept 02	Nucleic Acids & the Law of Beer	#2 Nucleic Acids; Beer-Lambert	Sept 09
3	Sept 09	Amino Acid & Peptide Analysis	#3 Amino Acids; Peptides; Electrophoresis	Sept 16
4	Sept 16	Protein Analysis	-None- (Exam 1 on Sept 17)	-----
5	Sept 23	AA Sequence Dictates 3D Structure	#4 Protein Structure/Function	Sept 30
6	Sept 30	Enzyme Kinetics	#5 Enzyme Kinetics	Oct 07
7	Oct 07	Enzyme Kinetics	#6 Enzyme Catalysis; Molecular Motors	Oct 14
8	Oct 14	Molecular Motors	#7 Carbohydrates & Bioenergetics	Oct 21
9	Oct 21	Metabolism - Thermodynamics	#8 Glycolysis; Gluconeogenesis; PPP	Oct 28
10	Oct 28	Pentose Phosphate Pathway	-None- (Exam 2 on Oct 22)	-----
11	Nov 04	PDH & the Making of Acetyl CoA	#9 Glycogen; TCA Cycle	Nov 11
12	Nov 11	Radioisotopes & Carbon Dating	#10 Isotopes	Nov 16 or 17 (exam on 11/19)
13	Nov 18	Oxidation/Reduction	#11 ETS/OxPhos; Oxidation/Reduction	Dec 02 (after fall recess)
<i>Fall Recess - No Class - No Homework Due</i>				
14	Dec 02	Chemiosmotic Theory	#12 Photosynthesis/FA Catabolism	Dec 09
15	Dec 09	Metabolic Engineering	-None-	-----

\*The Sapling Learning online homework assignments will be graded and will contribute to the final grade. Registration instructions for Sapling are at: <http://www2.saplinglearning.com/> {click on *Higher Ed* to create your account}. Each homework set will usually be due at 5:30 PM (PST) on the target date shown above; the actual due date and time may vary but will be shown at the Sapling course site. For 24 hr after each homework is due, you may still turn in homework answers for up to 50% of the original value. After 24 hr, no credit will be available.

The homework problems are designed to prepare you for Exams 1-4. Additional problems (ungraded) will also be available on Sapling & BbLearn. Useful, albeit optional, books - if you plan to spend significant time working at the bench in a life science research lab or taking additional biochemistry courses (e.g. Biochem I Lab, Biochem II), the Segel book is an excellent resource that has withstood the test of time.

- "Biochemical Calculations" 2<sup>nd</sup> Ed, Irwin H. Segel. 1976. John Wiley & Sons. ISBN-10: 0471774219; republished in 2010, ISBN-10: 8126526432; used copies of both editions are available
- "Used Math for the First Two Years of College" Clifford E. Swartz. 1993. ISBN-10: 0917853504 (used as low as ~\$11 at Amazon)