

BB451/551: Biochemistry (3 Credits)

Winter 2016

Day and Time	Monday, Wednesday, and Friday 12:00 noon – 12:50 pm, LInC 128		
Instructors	Dr. Victor Hsu 2143 Ag. Life Sci. Bldg. (ALS) (541) 737-4398 hsuv@onid.orst.edu		
Office Hours	MW 1:00–2:00 pm or by appointment		
Teaching Assistants	Allyson Erlendson	Jing Jie	Lindsay Winkenbach
Office Hours	Mondays, 10am, ALS 2031	Fridays, 1pm, ALS 2023	Thursdays, 9am, ALS 2162
Additional Hours Weeks 3/5/8	Wednesdays, 10am, ALS 2031	Tuesdays, 11am, ALS 2023	Tuesdays, 3pm, ALS 2162
Course Objectives	This course in general biochemistry is intended to integrate information about metabolic pathways with respiration (respiratory control) and initiate the student into a microscopic world where blueprints are made of deoxyribonucleic acids, factories operate using enzymes, and the exchange rate is in ATPs rather than Dollars or Euros. Beyond explaining terms, and iterating reactions and metabolic pathways, this course strives to establish that the same principles that govern the behavior of the world around us also govern the transactions inside this microscopic world of the living cell. And by studying and applying these principles, we begin to understand cellular and bodily processes that include sensory mechanisms.		
Learning Resources	The textbook we will be using is <i>Biochemistry</i> by Berg, Tymoczko and Stryer, Eighth edition (Seventh ed.). The readings are posted in the schedule below. It is expected that assigned reading be done <i>BEFORE</i> lecture. Suggested (ungraded) problems for exam preparation from each chapter are also given below. The lecture notes will be posted on Canvas (BB_451_X001_W2016). Si existe una demanda adecuada, los materiales usados en las clases podrán estar disponibles en español.		
Course Policies	Prerequisites: CH 333 and BB 450 are required. It is expected that students have mastered the simple organic chemistry of functional groups, general chemistry problem solving in stoichiometry, pH and equilibrium calculations and simple algebraic skills such as equation solving and use of exponentials and logarithms. Incompletes: Take this course only if you plan to finish it in a timely manner (during this term). An "Incomplete" will only be given when there is a strong and compelling case for doing so (e.g., health reasons, military commitment).		

Learner Outcomes	<p>The intention of this course is for the student to:</p> <ul style="list-style-type: none">Acquire the specialized language of biochemistry.Retain the concepts fundamental to biochemistry.Apply and describe concepts fundamental to biochemistry.Analyze and assess information concerning concepts fundamental to biochemistry.Communicate an understanding of key concepts relevant to biochemistry and the ability to use these concepts to solve problems in biochemistry via performance on written examinations.Demonstrate the ability to communicate and produce quality critical analysis of reported biochemical research results (BB551)
Learner Expectations	<p>First and foremost, we expect everyone to respect one another. Among other things, this means that only one person speaks at a time, and that each of you put forth an honest effort in class.</p> <p>Advance preparations, including reading assigned textbook pages before lectures are given.</p> <p>Prepare for exams by studying lecture notes posted on Canvas and the readings in the text.</p> <p>If there is difficulty in understanding concepts or problems, the student is expected to get help from and ask questions to the professor <i>before</i> it is too late.</p> <p>Recognition that an understanding of a complex topic like biochemistry requires considerable background prior to the class, a considerable amount of information to be acquired in the class, and sufficient time and effort to put these together to master the material.</p> <p>Eating, chewing gum noisily, using cell phones, etc. is inconsiderate to both the person lecturing and other students listening to the lecture. Thus, these activities are prohibited.</p> <p>Arrive to class on time, prepared and with all necessary materials. Be aware that significant time is required for studying the assigned readings, lectures, and notes and doing the hands-on assignments throughout the term.</p>
Course Evaluation	<p>Fulfillment of the student learning outcomes will be assessed through a set of exams and weekly assignments. There will be three non-cumulative midterm exams worth 100 points each and a cumulative final worth 200 points. The exams will be given on the dates and times indicated, <i>no exceptions</i>. A weekly assignment to identify the topic/concept that you found most difficult to understand/comprehend that week and submit a test question and answer based on that topic/concept will be submitted via Canvas by 11:59 pm each Friday (up to 4 points/week). Final grades will be assigned using a curved scale.</p> <p>BB 551 students will be required to write a paper. BB 551 grades will be based on 540 points plus 50 points for the paper. The paper assignment entails a critical analysis of a <i>recent, full-length, primary</i> research publication, dealing with any topic covered this term. The appropriateness of the article should be</p>

	<p>discussed with the instructor prior to February 19th. The paper should take the form of a written Journal Club presentation, in which the student presents a clear summary and critical analysis of the paper. The following questions should be considered and addressed: Is the paper a significant contribution to the knowledge base? If so, why? If not, why not? Are experimental methods clearly described? Do the authors adequately consider alternative models? Are the experiments convincing? Are the conclusions drawn justified based on the reported results? What are the most important future directions for the work? <i>Please make sure to substantiate your opinions by citing other work from the literature.</i> Recommended length of paper: 2–3 pages. Due Friday, March 11th, 1:00 pm. Earlier submission is strongly encouraged.</p>
<p>Statement Regarding Students with Disabilities</p>	<p>Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.</p>
<p>Statement of Expectations for Student Conduct</p>	<p>The University statement on student conduct and community standards can be found at: http://studentlife.oregonstate.edu/studentconduct/offenses-0</p> <p><i>Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations.</i> Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:</p> <ul style="list-style-type: none"> ◆ Cheating – use or attempted use of unauthorized materials, information or study aids ◆ Fabrication – falsification or invention of any information ◆ Assisting – helping another commit an act of academic dishonesty ◆ Tampering – altering or interfering with evaluation instruments and documents ◆ Plagiarism – representing the words or ideas of another person as one’s own <p>Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.</p> <p><i>“The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student’s freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.”</i></p>

Schedule			
Week 1	1/4	Campus Closure	
	1/6	Lipids & Membranes	Chapter 12, pp. 341–362 (pp. 345–366)
	1/8*	Citric Acid Cycle	Chapter 17, pp. 495–518 (pp. 497–519)
Week 2	1/11	Citric Acid Cycle, part II	Chapter 17, pp. 495–518 (pp. 497–519)
	1/13, 1/15* ¹	Oxidative Phosphorylation	Chapter 18, pp. 523–559 (pp. 525–560)
Week 3	1/18	Martin Luther King, Jr. Day observed: No class	
	1/20	Pentose Phosphate Pathway	Chapter 20, pp. 601–612 (pp. 601–611)
	1/22*	Midterm Exam #1	
Week 4	1/25, 1/27	Fatty Acid Metabolism	Chapter 22, pp. 643–673 (pp. 639–667)
	1/29*	Membrane & Lipid Synthesis	Chapter 26, pp. 767–776 (pp. 759–767)
Week 5	2/1	Steroid Synthesis	Chapter 26, pp. 776–797 (pp. 767–786)
	2/3	Nitrogen Metabolism	Chapters 23 & 24, pp. 681–739 (pp. 673–731)
	2/5*	DNA, RNA, and Genetic Information	Chapter 4, pp. 105–131 (pp. 109–133)
Week 6	2/8	Midterm Exam #2	
	2/10	DNA, RNA, and Genetic Information	Chapter 4, pp. 105–131 (pp. 109–133)
	2/12*	Purine & Pyrimidine Metabolism	Chapter 25, pp. 743–748 (pp. 735–745)
Week 7	2/15	Deoxyribonucleotide Synthesis	Chapter 25, pp. 748–763 (pp. 745–755)
	2/17, 2/19* ²	DNA Replication	Chapter 28, pp. 827–845 (pp. 819–837)
Week 8	2/22	DNA Repair	Chapter 28, pp. 845–852 (pp. 837–844)
	2/24	Recombination	Chapter 28, pp. 852–856 (pp. 844–848)
	2/26*	Transcription	Chapter 29, pp. 859–876 (pp. 851–869)
Week 9	2/29	Midterm Exam #3	
	3/2	RNA Processing	Chapter 29, pp. 876–890 (pp. 869–882)
	3/4*	Translation	Chapter 30, pp. 893–902 (pp. 887–897)
Week 10	3/7	Protein Synthesis	Chapter 30, pp. 902–921 (pp. 897–933)
	3/9, 3/11* ³	Gene Regulation	Chapters 31 & 32, pp. 925–958 (pp. 921–954)
<i>Finals Week (Wednesday)</i>			
	3/16	Final Exam, 12:00 noon	

*: Question of the week due, submitted via Canvas before 11:59 pm.

¹: Last day to add the class; ²: Last day to change to or from S/U grading, or to withdraw from the course

³: BB551 Written paper due, submitted via Canvas before 1:00 pm

Suggested Problems from the
Textbook

Chapter 12: 1–17, 19
(All)

Chapter 17: 1, 8, 9, 13, 17, 20, 22, 25, 31, 32, 34
(2, 6, 7, 10, 13, 15, 16, 19, 24, 25, 27)

Chapter 18: 3–7, 9, 10, 12–14, 19, 22, 25, 27, 30, 33, 34, 38, 40, 45, 48, 50
(3–6, 8–12, 16, 19, 21, 23, 26, 29, 30, 34, 36, 41, 44, 45)

Chapter 20: 20, 23, 24–26, 28, 30, 31, 38
(17, 19, 20–22, 24, 26, 27, 32)

Chapter 22: 3, 5, 8–11, 16, 21, 24, 25, 27, 30, 35, 36, 44, 48
(2, 4, 7–10, 15, 19, 21, 22, 24, 27, 32, 33, 40, 44)

Chapter 26: 1, 3, 5, 7, 15, 16, 18, 20, 29, 33, 34, 37, 38
(1, 3, 5, 7, 14, 15, 17, 19, 27, 31, 32, 34, 35)

Chapter 23: 1, 5, 7, 10–13, 15, 16, 19, 21, 24, 26, 28, 32, 36
(1, 5, 7, 10–13, 15, 16, 19, 21, 24, 26, 28, 31, 34)

Chapter 24: 1, 6–8, 13, 15, 16, 18, 30
(1–4, 11–13, 15, 26)

Chapter 4: 1–8, 10–12, 17, 19
(1–8, 10–12, 15, 16)

Chapter 25: 1–6, 9, 10, 12, 16, 19, 23, 26, 28, 33, 34, 36, 43
(1–6, 9, 10, 12, 15, 18, 20, 23, 25, 29, 30, 32, 38)

Chapter 28: 2–4, 7–12, 14, 19, 20a–c
(2–4, 7–12, 14, 19, 28a–c)

Chapter 29: 1–7, 14–16, 18, 22, 24
(1–7, 14–16, 18, 22, 24)

Chapter 30: 1–6, 10–12, 17, 18, 21, 25, 29, 32
(1–6, 10–12, 18, 19, 21, 23, 27, 31, 34)

Chapter 31: 1, 5, 6, 10, 12
(1, 5, 6, 10, 12)

Chapter 32: 4–7
(4–7)