BIOSC 1820
Metabolic Pathways and Regulation
Dr. Jeffrey L. Brodsky
Spring Term, 2022

The primary focus of this course is on the pathways of intermediary metabolism by which all cells synthesize and degrade carbohydrates, lipids (fats), and nitrogen-containing compounds. Specifically, we will examine the chemistry of the reactions that constitute these pathways and discuss how energy is derived from the breakdown of nutrients. We will also discuss how metabolic pathways are regulated by effector molecules and by hormones in living systems. Finally, we will consider how several human diseases arise from defects in metabolic pathways and review papers in the scientific literature on select diseases linked to altered metabolism.

NOTE*: Students who need biochemistry should either take BIOSC 1000 or 1810 and 1820. BIOSC 1000 and 1810 are considered course repeats, and you cannot take both for credit. If you are a Biological Sciences, Computational Biology, or Microbiology major and you elect to take BIOSC 1810 and 1820 instead of BIOSC 1000. In this case, BIOSC 1820 can count as an elective for your major.*

Prerequisite:	BIOSC1810 with a "C" or better, or with permission	
	***Please note*:**	**I will <u>not</u> be using Canvas in this course**
In person:	**Lectures**	Tuesday & Thursday: 9:30 AM-10:45 AM, 221 Langley Hall
	Recitation	Wednesday: 2:00-2:50 PM, 221 Langley Hall
When not in person:	Tuesday:	zoom
	Wednesday:	zoom
	Thursday:	zoom
Textbook:	<u>Principles of Biochemistry</u>. Lehninger, 8th Ed. (© 2021) (W. H. Freeman & Co.) ISBN-13 (paperback copy): 978-1-319-22800-2	
Contact Information:	Jeffrey L. Brodsky, Ph.D. A320 Langley Hall Phone: (412) 624-4831 Email: jbrodsky@pitt.edu	

Watch your email for PDFs of lecture notes, handouts, and examples of past exams and quizzes. These will be sent once a week.

Students are required to attend and ask questions at three office hour meetings before the midterm, and three office hour meetings between the midterm and final exam.

Undergraduate Teaching Assistants

Vaibhav Gupta
Email: Gupta.V@pitt.edu
Office Hours: **Tues & Thurs, 9-9:30 AM, 221 Langley Hall**

Bethany Hileman
Email: BAH105@pitt.edu
Office Hours: **Tues 5 PM, Hillman Library Ground Floor, & Zoom**

Alvin Liu
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Office Hours: **Tues 9-10 PM, Hillman Library Ground Floor, & Zoom**

Daisy Mandl
Email: TCM43@pitt.edu
Office Hours: **Wedn 1 PM, Langley Lobby**

Hannah Moore
Email: HEM74@pitt.edu
Office Hours: **Wedn 9 AM, Zoom**

Kate Querry
Email: KEQ4@pitt.edu
Office Hours**: Wedn 10 AM, Crawford 242 & Zoom**

Format: Lectures on Tuesday and Thursday will cover topics presented in the textbook. Handouts containing key information will be provided, but you are responsible for supplementing these notes with additional information presented in the lecture. The recitation sections on Wednesday will alternate between lectures, short quizzes on the material covered in the lecture/textbook, and discussions of papers drawn from the scientific literature on diseases that arise from metabolic disorders. Material presented in the recitations will appear on in-class quizzes. The overall amount of material that we will cover in this course is formidable: The **only** way to succeed is by regular attendance and participation, frequent reviews of your lecture notes, and reading the textbook and supplemental materials before lectures.

Grade: There will be one mid-term exam that will constitute 33% of your grade, and a final exam that will constitute another 33% of your grade. The final will not cover the entire course, but only material presented in the second half of the course. There will also be 6 quizzes given throughout the semester during recitation sections (see above)—the lowest grade will be dropped—and the remaining five quizzes will also total 33% of your grade. The final 1% of your grade is based on attendance at office hours.

Absences: If you miss the mid-term and/or the final due to an excused absence (written proof is required), a make-up exam will be given at the instructor's convenience. If the final exam is missed, then you will receive a "G" grade that will be converted into a letter grade once a make-up final exam is completed. If you miss a quiz, this will be counted as a "0" and will be dropped. If you miss more than one quiz with an excused absence, the remaining quizzes will be scaled to equal one-third of your final grade.

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity: Student Obligations. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include the confiscation of an examination of any individual suspected of violating University Policy. A minimum sanction of a zero score for the quiz or exam will be imposed.

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact me and the Office of Disability Resources and Services, 140 William Pitt Union, Monday–Friday, 8:30 am to 5:00 pm (412-648-7890) as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course.

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussions and/or activities without the advanced written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Each student is issued a University email address (username@pitt.edu) upon admittance. Students are expected to read email sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an email forwarding service that allows students to read their email via other service providers (e, g., Hotmail, AOL, Yahoo). Students that choose to forward their email from their pitt.edu address to another address do so at their own risk. If email is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University email address. To forward email sent to your University account, go to http://accounts.pitt.edu (login to your account, click on Edit Forwarding Addresses, and follow the instructions on the page.

DATE		TOPIC	TEXTBOOK
JAN	11 *Via Zoom*	**Carbohydrates & Glycobiology**	**Chapter 7**
	12 *Via Zoom*	**(continued)**	**(*only pp. 229-244)***
	13 *Via Zoom*	**Principles of Bioenergetics**	**Chapter 13**
	18 *Via Zoom*	**(continued)**	
	19 *Via Zoom*	**Glycolysis & Gluconeogenesis**	**Chapter 14**
	20 *Via Zoom*	**(continued)**	**(*only pp. 510-538 &*
	25 *Via Zoom*	**(continued)**	***546-552*)**
	26 *Via Zoom*	*Cancer Cell Metabolism (Bethany)*	
	27	**Glycolysis & Gluconeogenesis**	
FEB	1	**Regulation of Glucose & Glycogen**	**Chapter 15**
	2	*QUIZ #1*	***(also see pp. 409-438***
	3	**Regulation of Glucose & Glycogen**	***& 539-546*)**
	8	**(continued)**	
	9	*Glycogen Storage Diseases (Kate)*	
	10	**Citric Acid Cycle**	**Chapter 16**
	15	*QUIZ #2*	**(*also see pp. 735-736*)**
	16	**Citric Acid Cycle**	
	17	**(continued)**	
	22	**(continued)**	
	23	*QUIZ #3*	
	24	**Fatty Acids Catabolism**	**Chapter 17**
MAR	1	**(continued)**	
	2	*Help Session*	
	3	***MID-TERM***	
	15	**Amino Acid Oxidation, Urea Cycle**	**Chapter 18**
	16	*Urea Cycle Disorders (Alvin)*	**(*only pp. 625-644)***
	17	**Amino Acid Oxidation, Urea Cycle**	
	22	**Oxidative and Photophosphorylation**	**Chapter 19**
	23	*QUIZ #4*	**(*also see Chapter 20* **
	24	**Oxidative and Photophosphorylation**	***pp. 700-719*)**
	29 *Via Zoom*	**(continued)**	
	30	*Oxidative Damage & Neurodegeneration (Hannah)*	
	31 *Via Zoom*	**Oxidative and Photophosphorylation**	
APR	5	**Carbohydrate Biosynthesis** (*Daisy*)	**Chapter 20**
	6	*QUIZ #5*	***(only pp. 719-735)***
	7	**Carbohydrate Biosynthesis**	
	12	**Lipid Biosynthesis**	
	13	*QUIZ #6*	
	14	**Lipid Biosynthesis**	**Chapter 21**
	19	**(continued)**	
	20	*Cardiovascular Disease (Vaibhav)*	
	21	**Nucleic Acids**	**Chapter 22**
			(only pp. 823-832)
		FINAL EXAM: TBD	