

Biochemistry 2: CHEM-UA.882001

Dr. Burt Goldberg,
Professor of Biochemistry/Chemistry
Chemistry Department
Office: 1001N

Email: bg43@nyu.edu or burt.goldberg@nyu.edu or burt.goldberg@gmail.com

Phone: (212.998.7949 if I do not answer **do not** leave a message, just send an email)

My office hours will be on Tuesday & Thursday from 11:00 to 2:00 PM, room 1001N in the Chemistry Department office, feel free to drop by bring a friend ask questions. If you cannot make these times, please email for an appointment on Monday or Wednesday. I would like to introduce my colleague Dr. Rohini Qamra, who will be the Recitation Instructor for your Biochemistry2 course Dr. Qamra will post her office hours in a separate message to you.

Welcome to Biochemistry 2_001 Spring 2017. I am NOT in the office every day but will be in my office on Tuesday and Thursday for office hours, unless I have notified the class of a change. If I do then I will have make up office hours on Wednesday at the same time. Feel free to drop by during office hours. A good time to ask your questions is during recitation besides office hours, which means that you need to read the chapter prior to each class (lecture or recitation) and come to recitation with your **Study Guide (SG)** questions prepared and your questions (**in other courses this is called Homework; but HMK does not describe this well enough so SG**). I will try to answer questions during lecture when possible. Your grade is dependent on your performance on exams & quizzes. **I strongly urge students to form collaborative study groups** and to discuss their answers to the Study Guide questions with the members of their group. Groups should never be bigger than 4 members.

Course Goal: Text and course requirements; Let me first stress that **attendance as mandatory**. Why do I emphasize attendance? What I will stress in lecture is what I will hold you accountable for on your exams. What is in the text is only where I will begin. **The text is not the sum total of what will be covered.** Cell Biology and Biochemistry are two sides to the same coin. One cannot fully understand one without the other. The chemistry is the evolutionary stress for the development of cellular organelles. It is important for you to not only understand the chemistry but also to understand the relationship of the chemistry to the organelles. And important to understanding the chemistry is the regulation of these pathways. This means that these chapters are not separate topics but a continuum, and beyond Cell Surface Signal Transduction are the important cascade proteins in their role to regulate these pathways. To this end I will go over the cell biology as it relates to the biochemistry. I will add to your lectures reading on the Warburg Effect (and how finally we are starting to understand his findings in 1925! It is **not** about studying cancer Biochemistry, but nature's mutation that show how these cascade proteins effect control points in these pathways and the interactions. **Please do not miss recitation. There is no going to another recitation if you missed your assigned recitation without my permission. To go to another recitation you will need to ask my permission, and give a good reason beyond you over slept. The recitations are at room capacity, so this is a big deal. I need a good reason to say yes. Without my permission the Recitation Instructor Dr. Qamra will not allow your attendance with out my prior approval so email me. It is your responsibility to be at your recitation on time.**

This is a large class so please be on time. I expect that you will be present for examinations. If you are ill please notify me no less than 24 hours before hand, not after the examination has taken place. **I will expect an official doctor's note only (a report from Student Health is acceptable). Makeup examinations will not be given without good reason.** Each exam and the recitation accounts for 20 % of the course grade. All examinations will be problems and short answer questions.

The text for the course is **Biochemistry, Berg, Tymoczko & Stryer Biochemistry 8th edition**. I will also post readings from Review articles and peer reviewed research papers that are appropriate for our topic, they will be posted on **WORDPRESS, BIOCHEMISTRY_2 2016 website**, (more below about this site below).

Grading; 100-95= A, 94-90=A-, 89- 85= B+, 84-80 = B, 79-75=B-. 74 to 70 = C+, 69 to 65 = C, 64-60 = C-, if your grades put you below this I will strongly urge you to drop the course.

There will be 4 Exams and they will be on the following dates and times; Friday 2/17, 2/24, 4/28 and 5/08; 2-4:30 PM. The reason for this is simply I do not want you to be rushed through the exam. I want you to have the time to complete the exam and not to have to literally chase you out of the room. There is no way to extent the time with another class coming into the room following our lecture. The only alternative is Friday as you have done in both GChem and Orgo, the times of the exams will be 2 to 4:30PM. **The will not be a Final Exam.**

There will be a quiz at each recitation, when is up to Dr. Qamra. Do not be late there is no make up quiz, **ever**. Punctuality is required in recitation as it is in lecture. That is professional behavior. In the recitation you will receive a grade for the quiz (20% of your grade) and attendance counts. Please know how **seriously** I take attendance.

STUDY GUIDE (SG) and Recitation: this is an overview of what I will hold you responsible for from each chapter as well as additional assigned readings. You are expected to answer these questions for each chapter before the recitation on that chapter. It is always wise to outline the chapter as you read, and put the concepts of the chapter in your own words. The SG attempts to focus your reading on important terms, details and concepts. The SG is your responsibility (we will **not** collect these assignments and we will not grade them), but you may ask questions about these questions and your answers in recitation. **Doing the assignment is your responsibility.** There will also be questions about the external readings and they will be part of the SG. But let me be very clear: I am not collecting the Study Guide questions nor am I providing answers. **That is your job.** We want to discuss **your** answer in recitation and my office hours. We are there to help you understand if your answer is correct and complete. It is your responsibility to be prepared for lecture and recitation.

External readings will be placed on WORDPRESS. In general, these will be current review articles from numerous sources, such as Molecular Cell, Molecular Biology of the Cell, Annual Reviews of Biochemistry, Cell & Cell Metabolism, Annual Review of Cell and Developmental Biology, and Nature. It would be prudent to answer these questions as you read, prior to lecture and recitation. These papers and question on the data presents in these papers are the basis for the discussion by you during recitation. **Do understand that any question posed by me to you and anything you have read or I have lectured on is a fair question for exams. The exams will contain data analysis questions.**

WORDPRESS. This is our website. I will post readings and questions about the reading. It will be a site for you to ask questions and for others to answer those questions. It is a place for dialogue about the specific topics. It will be arranged according to topics (chapters).

Syllabus; This is a list of topics and not a schedule.

Topics	Topic	Chapter & Reading
1	Introduction to course; How does the evolution of compartmentalization affect the energetic and change the chemistry of eukaryotic cells?	WP Post
2	How are proteins sorted into the correct compartment; ER & Mitochondria	
3	METABOLISM THE OVERVIEW- How did we come to understand that metabolism is arranged in metabolic pathways? How are metabolic pathways regulated, controlled and how interactive are they?	Stryer 15
4	Glycolysis/Gluconeogenesis, Glycogen phosphorylation/glycogen synthesis, β -oxidation / FA synthesis of FA; What do they have in common? Why is glycolysis a central pathway in energy transfer? Pyruvate is the end product of glycolysis, what are its fates?	Stryer 16
5	Are there significant alternative pathways to glycolysis? The Pentose phosphate pathway.	Stryer 16, 20.3, 20.4 & 20.5
6	Gluconeogenesis a reciprocal pathway to glycolysis: How can a cell switch from glycolysis to gluconeogenesis? Why is the synthesis of glycogen tightly regulated? Signal transduction regulation of glycogen synthesis and hydrolysis. How does this relate to fatty acid synthesis, TCA cycle and glycolysis?	Stryer 21
7	What is the relationship of the TCA cycle to gluconeogenesis?	Stryer 16 & 17 Last Topic for first Midterm
	What is the origin of the mitochondria? How is the	WP Post

mitochondria related to the hydrogenosome and mitosome.

2/17 First Exam

- | | | |
|-----------|--|--|
| 9 | Aerobic respiration and ATP synthesis by an H ⁺ pumping mechanism. (ATP) synthase) & comparison with vATPase and the Na-K ATPase. | Stryer 18, There will be posted On the structure of the ATPase family on WP. |
| 10 | The Transporters of the mitochondria, the sites of synthesis of the inner and outer membrane of the mitochondria | Posted on WP |
| 11 | b-oxidation & Fatty Acid Synthesis; How are the TCA cycle, b-oxidation and FAS connected to amino acid and glucose metabolism? | Stryer 22 |
| 12 | Biosynthesis of membrane lipids & sterols. The entero-hepatic cycle: the liver and the metabolism of Fatty acids & sterols. | Stryer 26 |
| 13 | How does a cell turn-over its proteins? How can amino acids be utilized as a source of cellular energy? | Stryer 23 |

Spring Break, No Classes 3-13 to 3-19

3-24 Second Exam

- | | | |
|-----------|---|-----------|
| 14 | How does amino acid catabolism interact with the TCA cycle and the Urea cycle? | Stryer 23 |
| 15 | Relationship of TCA cycle-Urea cycle and gluconeogenesis and the relationship of the striated muscle and liver cells through these pathways. And, how it relates to the Warburg Effect. | WP |

- 16 Biosynthesis of Amino Acids Chapter 24
- 17 Iron transport & FeS crystals folded into protein. Posted on WP
- 18 Let first revisit the Pentose Phosphate Pathway as it relates to nucleotide synthesis. Biosynthesis, Purines, Pyrimindes
Biosynthesis: Stryer 25
NUCLEOTIDE; Biosynthesis, Stryer 25
salvage pathways & reduction of ribose to deoxyribose phosphate.
- 3rd Exam 4-28**
- 19 **Warburg Effect; what has it taught about control & regulation of metabolism**
- 4th Exam 5-08**