Chemistry 385, MWF 10:45-11:40 SC374

St. Olaf College, Spring 2004
Dr. Gregory W. Muth
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Office hours: M, T, F 2:00-3:00 PM
or by appointment

Recommended materials:
Text: Biochemistry by Lubert Stryer, 5th edition, 2002

Course description:

Having covered the molecules and energetics of biologically related chemical systems, we will continue our investigation of a variety of additional biochemical problems and processes. The goal of this course is to begin to foster independence and active learning of cutting edge biochemical topics. We will work together to compare, contrast and analyze published literature all the while building our critical thinking skills and honing our presentation abilities both through written and spoken formats.

Class policies and philosophies:

We will all have the opportunity to present current topics in biochemistry. I would like to maintain an encouraging, challenging environment for personal growth and discussion. With this said comments and questions must be made with sincerity, honest and tact. That doesn't mean we can 't have fun!

I will have an open door policy as much as possible so please drop in. Also, I will be using the course website to convey information, post solutions, give hints and tips and provide links to additional resources. Please use this and e-mail as primary resources.

Grading and Course Requirements

The course will consist of a mid-term and a final exam as well as group meetings and project presentations (see below). The point structure follows:

Exams 2 @ 100 points each	200 points
Group Meetings 4 @ 10 points each	40 points
Project presentation	100 points
Total	340 points

The following percentages are a guideline for grade assignment:

100-90% A/A- 89-80% B+/B/B- 79-70% C+/C/C- 69-60% D+/D/D-

Exams:

Each exam during the semester will cover material from lecture, homework and any additional handouts. I strongly encourage class attendance, as some material from primary literature will be presented that is not found in the book. The final exam will be comprehensive. Since each concept builds upon the previous one and so many are integrated, it is important to "live" with biochemistry a little each day. The exams will challenge your mastery of the facts as well as an ability to "think outside the box". Be prepared to derive, synthesize and evaluate new situations. The Honor System will apply during exams. Exam absences due to emergencies or illness will only be excused if the Dean of Students office informs me.

Group meetings:

Your enrollment in Chem 385 suggests you have a passion for biochemistry. I want you to take that passion and focus it into a detailed, organized thorough area of which you will become the class expert. On the first day of class we will take time to discuss possible research areas. You will then independently study these areas, exploring the literature, the people and the experiments that remain to be done. As your investigation grows you will be required to develop an independent unique hypothesis about your research topic and the biochemical techniques you would use to generate data to test the hypothesis. Every two weeks you will present your progress in a concise 5 minute talk and hand in a one paragraph summary with your current bibliography. The meetings could have the following general format:

Group meeting 1: Project brainstorming, what broad areas are you interested in?
Group meeting 2: Focus on one biochemical aspect of you bigger topic area
Group meeting 3: Present your hypothesis
Group meeting 4: Present one technique to test your hypothesis

Final Project Presentations:

As noted above your topical research will culminate in the presentation of your final project. In a 20-25 minute seminar style talk, you will cover a brief overview of the topic and its importance/ significance to the field of biochemistry, what is currently known, various models and methods used to generate data and what you are proposing to continue to study this area and why this is novel and unique. Your presentation with be reviewed by myself and your peers.

Biochemistry II Tentative Schedule

Month	Date	Day	Topic	Reading
Feb	9	M	Introduction	
	11	W	Aquaporin structure	1, 2
	13	F	Aquaporin structure	3-7
	16	M	Crystallography	Chapter 4.5
	18	W	NMR	Chapter 4.5
	20	F	Nobel Lecture*	9:00 AM SC280*
	23	M	Group meeting (Possible Project Areas)	
	25	W	Photosynthesis	Chapter 19
	27	F	Photosynthesis	Chapter 19
March	1	M	Calvin cycle	Chapter 20
	3	W	Glycogen metabolism	Chapter 21
	5	F	Glycogen metabolism	Chapter 21
	8	M	Group meeting (Focussed Project Area)	
	10	W	Fatty acid metabolism	Chapter 22
	12	F	Fatty acid metabolism	Chapter 22
	15	M	Amino acid catabolism	Chapter 23
	17	W	Amino acid catabolism	Chapter 23
	19	F	**Exam 1**	
			Spring Break	
	29	M	Group meeting (Hypothesis)	
	31	W	Amino acid synthesis	Chapter 24
April	2	F	Amino acid synthesis	Chapter 24
	5	M	Lipid biosynthesis	Chapter 26
	7	W	Lipid biosynthesis	Chapter 26
			Easter Break	
	14	W	Integration of metabolism	Chapter 30
	16	F	Integration of metabolism	Chapter 30
	19	M	Group meeting (Techniques)	
	21	W	Control of gene expression	Chapter 31
	23	F	Control of gene expression	Chapter 31
	26	M	Control of gene expression	Chapter 31
	28	W	Molecular motors	Chapter 34
	30	F	Molecular motors	Chapter 34
May	3	M	Molecular motors	Chapter 34
	5	W	Project Presentations	
May	7	F	Project Presentations	
	10	M	Project Presentations	
	12	W	Project Presentations	
	14	F	Project Presentations	
	17	M	Review	
	20	Th	Final Exam (9:00-11:00 AM)	

* If you are unable to attend, meet at the regular class time for a special screening

Bibliography

1. Fujiyoshi, Y., et al., *Structure and function of water channels.* Current Opinion in Structural Biology, 2002. **12**(4): p. 509-515.
2. Agre, P. and D. Kozono, *Aquaporin water channels: molecular mechanism for human diseases*, Febs Letters, 2003. **555** (1): p. 72-78.
3. Tajkhorshid, E., et al., *Control of the selectivity of the aquaporin water channel family by global orientational tuning.* Science, 2002. **296**(5567): p. 525-530.
4. Sui, H.X., et al., *Structural basis of water-specific transport through the AQP1 water channel.* Nature, 2001. **414**(6866): p. 872-878.
5. de Groot, B.L., A. Engel, and H. Grubmuller, *A refined structure of human aquaporin-1.* Febs Letters, 2001. **504**(3): p. 206-211.
6. Fu, D.X., et al., *Structure of a glycerol-conducting channel and the basis for its selectivity.* Science, 2000. **290**(5491): p. 481-486.
7. Murata, K., et al., *Structural determinants of water permeation through aquaporin-1.* Nature, 2000. **407**(6804): p. 599-605.