Physical Biochemistry, CHEM 5070, Fall 2015, 3 Credits
Section 1, T R, 9:00-10:15 AM, ESLC053

Instructors: Prof. Lance Seefeldt, lance.seefeldt@usu.edu
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Office Hours: Available by appointment. Please send an email to arrange a time.

Course Content: This course will explore the physical foundations of the reactions occurring in living cells. This course is intended to extend from the foundations provided in the year-long sequence Chem 5700-5710. In this course, we will cover the physical foundations for the biomolecules of life, how energy is utilized, cellular communication, kinetics and mechanism, and the synthesis of DNA and proteins. It is expected that students will have a solid foundation in biochemistry, chemistry, biology, and math. The course is designed to contribute to mastery of the overarching learning objectives in biochemistry:

- Students should be able to explain and apply core concepts of matter and energy transformation, including thermodynamics, catalysis, the coupling of exergonic and endergonic processes, and the nature of biological energy.
- Students should be able to explain and apply core concepts of underlying homeostasis, including the need for biological balance, linked steady state processes, quantification of homeostasis, the organization of chemical processes, and control mechanisms.
- Students should be able to explain and apply core concepts of biological information, including the genome, the manner in which the information it contains is encoded and translated, and the mechanisms by which it is transmitted and maintained across generations.
- Students should be able to explain and apply core concepts of macromolecular structure and function, including the nature of biological macromolecules, their interaction with water, the relationship between structure and function, and frequently-encountered mechanisms for regulating their function.
- Students should understand the process of science, including hypothesis generation, experimental design, quantitative analysis, and data interpretation.

Text and iClicker: *The Molecules of Life, Physical and Chemical Principles* by Kuriyan, Konforti, Wemmer; Garland Science, 2013. ISBN 978-0-8153-4188-8. Students should have access to an iClicker, which will be used in parts of the course.

Canvas: The lecture notes, exam keys, grade sheet, etc. for this course will be available through the course Canvas page. This site is found at canvas.usu.edu. Username = Banner ID; Password = Banner pin. Only students who are registered for the class will have access to the course Canvas page.

Exams: There will be three exams in this course, each worth 100 points. The exams will be closed book. You can use a calculator (no internet connected devices).

Assignments: There will be 8 assignments, each worth 10 points. These are open book. Details for each assignment will be provided in class.

Grading: Grades will be based on a total of 380 points. At a minimum, the University Grading Scale will be used: A 100-93.00%, A- to 90.00%, B+ to 87.00%, B to 83.00%, B- to 80.00%, C+ to 77.00%, C to 73.00%, C- to 70.00%, D to 60.00%, F below 60.00%.

Missed Exams: Exams missed for acceptable reasons (see policy manual) can be taken upon approval of the faculty. Please contact the faculty as soon as possible to determine how the exam will be taken.

Assessment: Assessment of the course will include the University online IDEA evaluation conducted at the end of the course. Information from the evaluation will be used to improve the course.

Provisions: This course will adhere to the USU Academic Policies and Procedures Manual found at the web site http://www.usu.edu/policies/ and in the student code http://www.usu.edu/studentservices/studentcode/. Any student with a disability who requires accommodation must contact the instructor. The disability must be documented by the Disability Resource Center. Course materials may be requested in alternative formats.

Chemistry 5070, Fall 2015

Day	Date	Instructor	Topic	Chapter	Notes
T	9/1	Johnson	Genes to Proteins	1	
R	9/3	Johnson	Nucleic Acid Structure	2	
T	9/8	Johnson	Lipids, Protein Structure	3-4	
R	9/10	Johnson	Protein Structure, Evolution	4-5	
T	9/15	Seefeldt	Energy and Entropy Review	6-7-8	
R	9/17	Seefeldt	Free Energy	9	
T	9/22	Seefeldt	“		
R	9/24	Seefeldt	Chemical Potential	10	
T	9/29	Seefeldt	“		
R	10/1	Seefeldt	Voltages and Free Energy	11	
T	10/6		Exam 1		
R	10/8	Hevel	Molecular Recognition	12	
T	10/13	Hevel	“		
R	10/15	Hevel	Macromolecular specificity	13	
T	10/20	Hevel	“		
R	10/22	Hevel	Allostery	14	
T	10/27	Hevel	“		
R	10/29		Exam 2		
T	11/3	Hengge	Catalysis and Rates	15	
R	11/5	Hengge	“		
T	11/10	Hengge	“		
R	11/12	Hengge	Enzyme mechanisms	16	
T	11/17	Hengge	“		
R	11/19	Hengge	“		
T	12/1	Johnson	Folding	18	
R	12/3	Johnson	DNA and Protein Synthesis	19	
T	12/8	Johnson	“		
R	12/10		Study day – no lecture		
R	12/17		Exam 3 – 9:30 AM		