



# CHM4413L: Biophysical Chemistry Laboratory

for UF Chemistry/Biochemistry Majors

Sections (W: 12D5, 3784), (R: 12ED, 4733), (F: 21D5, 6105)

Spring 2018 (January 8 – May 4)

(2 Credit Hours)

Course Website: <http://elearning.ufl.edu/>

**Course Materials and “Manual:”** All course materials will be available through our secure course website, listed above, which is a Canvas LMS site hosted by Instructure. There is no printed textbook or lab manual.

### Instructors:

**Alex Angerhofer (sections 12D5, 21D5, and 3784)**

E-Mail: [alex@chem.ufl.edu](mailto:alex@chem.ufl.edu)

Office Hours: T-9, R-8 periods, CLB318A

**Adam Mansell (sections 12ED, 4733, and 6105)**

E-Mail: [adam.mansell@chem.ufl.edu](mailto:adam.mansell@chem.ufl.edu)

Office Hours: T-2, W-6 periods, LEI232

### Teaching Assistants:

**TA (12D5, W): Justin Goodsell ([jgoodsell@chem.ufl.edu](mailto:jgoodsell@chem.ufl.edu))**

Office Hours: T-7, F-2 periods, CLB316

**TA (12ED, R): Lakshitha Perera ([blak.perera@ufl.edu](mailto:blak.perera@ufl.edu))**

Office Hours: R-11, F-2 periods, LEI248

**TA (21D5, F): John Tokarski ([tokarskijt@chem.ufl.edu](mailto:tokarskijt@chem.ufl.edu))**

Office Hours: M-2,3 periods, NPB B8

**TA (3784, W): Yue Hu ([hulilis@chem.ufl.edu](mailto:hulilis@chem.ufl.edu))**

Office Hours: W-2,3 periods, CLB313

**TA (4733, R): Aravinda Munasinghe**

([aravinda1879@chem.ufl.edu](mailto:aravinda1879@chem.ufl.edu))

Office Hours: R-11, F-2 periods, LEI248

**TA (6105, F): Yunlu Zhang ([ylzhang@chem.ufl.edu](mailto:ylzhang@chem.ufl.edu))**

Office Hours: F-3,4 periods, CLB313

**TA (all sections): Jiawei Huang**

([jiawei Huang@chem.ufl.edu](mailto:jiawei Huang@chem.ufl.edu))

Office Hours: W-2,3 periods, CLB311

### Office Hours:

Individual office hours are listed above for the instructors and TAs. Office hours will also be given by appointment if you have a conflict with the ones listed.

### Weekly Lecture Period:

Weekly lectures supporting the lab activities take place during T-1 period (7:25 – 8:15 am) in LEI 207. Attendance is mandatory.

### Lab Sessions

Each section is assigned a specific afternoon meeting time (6<sup>th</sup> through 10<sup>th</sup> periods) for lab activities in either LEI 248 or LEI 204. You need to come prepared for the lab and know what you are supposed to be doing. The TAs may test your knowledge of the experiment you are about to do with a pre-lab quiz and may turn you away if they find you unprepared. Contact your instructors and group members well in advance of any anticipated absence so alternative scheduling can be

### SPRING SEMESTER 2018

	S	M	T	W	T	F	S
Jan.		Holiday 1	2	3	4	Registration 5	6
	7	8	9	10	11	12	13
	14	Holiday 15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			
Feb.					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28			
Mar.					1	2	Spring Break 3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
Apr.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	Reading Days 26	27	28
	29	30					
May							Commencement 5
	Comm. Grades Due 6	7	8	9	10		

made. For some weeks your lab group may be assigned a specific time of arrival.

### Lab Safety

All safety procedures must be strictly obeyed. Safety glasses must be worn at all times in the laboratory. Wear long-sleeved and -legged clothes to protect your skin against spills, or bring a lab "kittel." Closed-toed shoes are mandatory. Remove all pendant jewelry when working in the lab. If you have long hair, you may not let it hang loose but should tuck it away safely so that it doesn't present a potential hazard for you. Refer to the [ACS safety manual](#) (click on the link or find under Modules → Resources) which regulates all safety procedures in the lab.

### Ethics

Students are expected to conduct themselves professionally in this course. This includes following the UF Honor Code (see below) and a complete understanding of academic integrity. Plagiarism and data fabrication will not be tolerated.

### Groups

Each lab section will be divided into groups of two students. You will work together as a team in the lab. For some labs several groups will work together. Lab reports will be submitted individually on an alternating biweekly basis.

### Lab Notebook and Data Plotting.

Every good Chemist has a lab notebook by their side. It is a journal, evidence of discovery, a historical record, and a valuable tool. You will keep a proper lab notebook in this course. Your notebook will be graded and checked upon leaving each lab period. You should come to lab prepared with all tables and notes within the lab notebook. Even when working in a group each student should have complete data notes within their own lab notebook. You also should have at least one person in your group come with a laptop that has sufficient software to plot data before you leave the laboratory session. It is your responsibility to repeat data measurements in cases where things have gone awry. Many assignments are to show your pre-processed data or preliminary graphs BEFORE leaving the laboratory period. The "check" of the notebook will be "acceptable" or "unacceptable." **Acceptable yields a grade of 100%. Unacceptable yields a grade of 50% or less. Grades for notebooks will be averaged at the end of the semester.**

### In-Lab Data Analysis

The laboratory session will not just be used for acquiring data, but also for initial analysis and plotting of data and an assessment whether or not any experiments need to be repeated before leaving the laboratory.

### Written Lab Reports

Each student will be responsible for four full lab reports out of the eight labs for the semester, and a library project report. The two students in each group will alternate submitting lab reports which leads to a two-week period between successive written lab reports.

Instructions for preparation of reports and a sample report can be found in Shoemaker, Garland, Nibler (SGN) or other lab textbooks. Two examples of good lab reports from past years can be found on canvas under Modules → Resources. Graders will follow the grading rubrics found on canvas under Modules → Resources. They will be particularly concerned with the following important points:

1. Introduction: state purpose and/or problem on which the experiment is focused. Briefly indicate the theory or hypothesis to be verified.
2. Experimental: Briefly describe the procedure used. Include an illustration of a block diagram of the experimental set-up unless it is described elsewhere in which case you should cite it and discuss any deviations from that set-up.
3. Calculations and Results:
  - a) Give a sample calculation showing how results were obtained.
  - b) Summarize the calculated results, using tables and graphs where possible.
4. Uncertainties in Results:
  - a) Discuss the most important sources of random and systematic errors.
  - b) Derive a quantitative estimate of the uncertainty in the experimental results obtained.
  - c) Indicate the uncertainty of calculated results in your tables as  $X \pm Y$  and in graphs as error bars or boxes.
5. Whenever possible and appropriate use mathematical, spreadsheet and/or graphing software for your analysis, such as Mathematica, Matlab, Matplotlib, MS Excel, xmgrace, Texplot, Sigmaplot, etc. Make sure that your plots look professional. The default setting of MS Excel is particularly notorious in producing awful plots. If you decide to work with Excel, make sure to modify the settings to produce high quality plots. A tutorial for Matlab has been placed on Canvas and can be found under Modules → Resources.

6. Discussion: Based on your experimental results evaluate your data in terms of the applicable theory. Determine whether your results corroborate or disprove the working theory/hypothesis. Suggest reasons for such disagreements and try to analyze them as much as possible. If your results fit within the accepted theory, discuss to what extent (to which experimental precision) this is the case. Discuss strengths and weaknesses of the approach. Discuss what improvements could be done to the experimental approach and/or the theory. Try to answer the questions/problems raised in the introduction.

7. Conclusions: Briefly restate the most important conclusions worked out in the Discussion section, give important measurement results with proper error limits, and state how your work fits into the bigger scheme of things (as outlined in the introduction). Reports should be prepared by computer. Either use a word processing program or one of the more advanced mathematics programs that allow you to intersperse text with calculations and figures. Pay attention to typos (use your word processing program's spell-checker), and to proper grammar.

8. Deadlines: All laboratory reports are due two weeks after the experiment has been performed at 12:50pm, *i.e.*, at the beginning of the lab sessions. Late reports will be penalized by 20 points per day counting with the 12:50pm deadline. Final and absolute deadline for anything (*e.g.*, last report) is Wednesday, April 25th, 6pm (last day of classes).

### Oral Reports

Each student will give two oral reports during the semester. These will be scheduled during the weeks of 2/19 or 2/26 (depending on your section) and 4/9, and will take place during the time blocks reserved for the labs. They will be done by section. Each student has 10 minutes to make their presentation followed by 2 to 3 minutes of discussion. All students will participate in grading each other's presentations by following the grading guidelines found on Canvas under Modules → Resources. Example presentations can be found there as well.

### Course Objectives

- Create publication-quality scientific reports.
- Analyze and present experimental data graphically, cogently, and succinctly.
- Keep a professional scientific notebook.
- Perform reliable and accurate measurements.
- Interpret and expand scientific protocols and experimental design.
- Give a professional presentation on scientific work performed in the lab.

### Course Grade Computation

Your letter grade will be derived from a simple calculation: the weighted average of your performance in:

	Number of Assignments	Points Per Assignment	Total Points	Percentage Points
<b>Quizzes (prelab and post lab feedback)</b>	varies	varies	200	10%
<b>Notebook</b>	8	50	400	20%
<b>Library Report</b>	1	100	100	5%
<b>Oral Reports</b>	2	200	400	20%
<b>Written Reports</b>	4	200	800	40%
<b>Subjective Grade</b>			100	5%
<b>Total</b>			2000	100%

Your course grade will be determined from your total course performance percentage as follows:

>85%	A
80%	A-
75%	B+
70%	B
65%	B-

60%	C+
55%	C
50%	D
< 50%	E

All grades will be posted in the Canvas GradeBook, as available.

UF's Grading Policy: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

### Absences and Tardiness

Excused absences are allowed in accordance with UF policy. Consult with your instructor and group members in advance. Do not arrive late to your lab. Tardiness will lead to loss of points on the 'subjective grade.' Unexcused arrival more than 30 minutes late for a lab may result in the student not being admitted to the lab. This leads to an automatic loss of all notebook points and the student may not use this lab for a written or oral lab report.

### Late Submission Policy

Typically, a late assignment will receive a late penalty of 10% per workday past the scheduled due date.

### Getting Help

For quickest response, you might find posting questions to the Canvas Discussion Board might be a good choice.

Messaging the Instructor, or even a classmate also works.

For Username/Password issues, such as difficulties logging into any Gatorlink-authenticated site at UF, (including our course website), please contact the UF Help Desk at: [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu), (352) 392-HELP - select option 2.

#### Lecture/Experiment Schedule

Week	Date	Lecture	Experiment
1	8-Jan	Introduction/ Pipette Calibration	None
2	15-Jan	Error Analysis	Pipette Calibration
3	22-Jan	UV-Vis Introduction	UV-Vis
4	29-Jan	Heat capacity ratios	Library
5	5-Feb	NMR	Heat capacity ratios/ NMR
6	12-Feb	Spectroscopy	Heat capacity ratios/ NMR
7	19-Feb	EPR	EPR/ Oral Reports
8	26-Feb	Computations	EPR/ Oral Reports
9	5-Mar	Spring Break	
10	12-Mar	pKa	pKa
11	19-Mar	Particle in a Box	Particle in a Box
12	26-Mar	Enzyme Kinetics	Enzyme Kinetics (part 1)
13	2-Apr	Enzyme Kinetics	Enzyme Kinetics (part 2)
14	9-Apr	No Lecture	Enzyme Kinetics (Makeup)
15	16-Apr	No Lecture	Oral Reports
16	23-Apr	No Lecture	No lab

### University Policy on Accommodating Students with Disabilities

Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

### University Policy on Academic Misconduct

This class will operate under the policies of the student honor code which can be found at: <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>. The students, instructor, and TAs are honor-bound to comply with the Honors Pledge: **We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.** You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."* It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks. Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>.

### Disclaimer for this document

Note: All aspects of course operations, including grading, course policy and policy execution, are subject to change at the discretion of the course instructor.

If you have further questions, please contact us. Have a great semester!

Sincerely,

Alexander Angerhofer and Adam Mansell.