CHM4411L: Physical Chemistry – Thermodynamics and Chemical Kinetics

Instructor: Russ Bowers
Email: Use Canvas messaging for all correspondence
Office Hours: F 3-5 pm (via Zoom)

Teaching Assistant: Michelle Lapak
Office Hours: TBD

Class Meeting Times: MW periods 2-3 (8:30 – 10:25 AM)

Textbook

Physical Chemistry, 4th Edition, Wiley ([E-Book](#))
Robert J. Silbey, Robert A. Alberty, Moungi G. Bawendi
ISBN: 978-0-470-47300-9

Additional Resources

Atkins' Physical Chemistry 11e, Volume 1: Thermodynamics and Kinetics, Peter Atkins, Julio de Paula, and James Keeler, 2018 ISBN: 9780198817895, Paperback, [Oxford University Press](#)

Course Description

This subject deals primarily with equilibrium properties of macroscopic systems, basic thermodynamics, chemical equilibrium of reactions in gas and solution phase, and rates of chemical reactions.

Activity Schedule (subject to change)

Session	Date	Topic	Reading (ASB)	HW Due
1	8/23	State of a system, 0th law, equation of state		
2	8/28	Work, heat, first law		
3	8/30	Internal energy, expansion work		
4	9/4	Enthalpy		
5	9/6	Adiabatic changes	CH 1, 2.1-2.8	PS 1
6		Thermochemistry		
7	9/11	Calorimetry		

	9/13			
	9/18			
	9/20			
8	9/25	Second law	CH 2.9-2.13	
9	9/27	Entropy and the Clausius inequality		PS 2
10	10/2	Entropy and irreversibility		
11	10/4	Fundamental equation, absolute S, third law	CH 3.1-3.5, 3.7	PS 3
12	10/9	Criteria for spontaneous change		
13	10/11	Gibbs free energy	3.8-3.9	PS 4
14	10/16	Recharge Day, No Lecture		
15	10/18	Multicomponent systems, chemical potential		
16	10/23	Chemical equilibrium	CH 4.1-4.4, 4.6-4.7, 4.9	PS 5
17	10/25	Temperature, pressure and Kp		PS 5
18	10/30	Equilibrium: application to drug design		
19	11/1	Phase equilibria — one component	CH 5.1, 5.3-5.8	PS 6
20	11/3	Clausius-Clapeyron equation		
21	11/6	Phase equilibria — two components	CH 6.1-6.4	
22	11/8	Ideal Solutions		PS 7
23	11/13	Non-ideal solutions		
24	11/15	Colligative Properties	CH 6.5, 6.6, 6.7	PS 8
25	11/20	Introduction to reaction kinetics		
	11/22	No class meeting, Holiday		
26	11/27	Complex reactions and mechanisms		

27	11/29	Steady-state and equilibrium approximations	CH 18.1-18.5	PS 9
28	12/4	Temperature dependence, E_a, catalysis		
29	12/6	Review for Final	CH 18.6-18.10	PS 10
	12/14	FINAL EXAM @ 12:30 - 2:30 PM		

Class Meeting and Recording Policy

Our class sessions may be audio-visually recorded for use by students. By participating with their camera engaged or profile image shown, students agree to have their video or image recorded. If the student is unwilling to consent to have their profile or video image recorded, the student should attend without video or profile picture enabled. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded.

If a student is unwilling to consent to have their voice recorded during class, they should keep the mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

2) This course is managed through Canvas. Course materials will be provided with an excused absence, and a reasonable amount of time will be allowed to make up work.

[More information in the university attendance policies](#)

Meeting times

Lectures: M,W | Period 2 - 3 (8:30 AM - 10:25 AM)

Attendance Policy

If you're going to miss any lecture for any reason, please let the instructor know in advance. Don't be late. Attendance is recorded.

Grading

Your grade will be derived from the weighted average of performances in each component:

Quizzes	500 points
Homework	200 points
Final Exam	300 points

Quizzes	500 points
Total	1000 points
Extra Credit: good conduct	up to 50 points*

*All students will receive 50-points automatic extra-credit for conducting themselves in a professional manner that is conducive to effective learning engagement, respectful of peers, and respectful of the instructors. Students with two or more violations of the conduct policy will be ineligible for this automatic extra credit.

Examples of violations of conduct expectations:

- Unauthorized distribution of external links through zoom chat.

- Sending an unsigned (anonymous) external email to the instructor or TA

- Excessive copying or sharing of homework set answers between or among users on external social media type apps. This may be considered as an on honor code violation and will be reported as such. No copying, sharing, or cooperation of any kind is allowed on quizzes or the exam. Students must work independently on those assignments.

Grade Scale:

Grade	Range
A	1000-900
B	900-800
C	800-700
D	700-600

Anyone scoring over 900 points will receive an A grade, 800-900 will be B, and 700-800 will be a C. However, it is anticipated that the class will eventually be "curved" downward, so that, for example, it may be possible to get an A with a score in the B or (maybe?) C range. However, a student getting 904 points will get an A, even if every student in the class gets more than 900 points.

All grades will be posted in Canvas, as available.

UF's Grading Policy

http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Suggested Software

PDF Scan Software - for scanning your notebook pages into PDF for uploading onto Canvas. [Genius Scan](), by Grizzly Labs, is highly recommended. The app is available for IOS or Android phones. PDF scans cam be directly uploaded to Cloud Storage such as UF Google Drive, Dropbox, or UF OneDrive.

Spreadsheet software - Microsoft Excel or Google Sheets. For manual data logging and data manipulation, and quick plots of raw data. For reports, better quality plots can be generated using Magic Plot (see above).

Word Processing - The standard is MS Word with the built-in equation editor. Any other word-processing software with equation editing capability is also acceptable.

UFApps - UFApps offers many different software packages to UF students free of charge.

Mathematica – Wolfram's symbolic math program. Students have access to Mathematica through UFApps. A tutorial can be found here: https://www.wolfram.com/language/elementary-introduction/2nd-ed/index.html

UF OneDrive - required for transferring files between your local computer and UFApps.

Late Submission Policy

Late assignments will receive a late penalty of 10% per day past the scheduled due date. If something arises that prevents you from completing the assignment on time, contact the instructor as soon as possible to request an extension.

Getting Help

For the quickest response, you might find it useful to post questions to the Canvas Discussion Board. Messaging the Instructor, TA, 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, (352) 392-HELP - select option 2.

UF Policies Shaping This Course

This course is aligned with the UF policies below.

- Contact Hours: "Contact Hours" refers to the hours per week in which students are in contact with the instructor, excluding office hours or other voluntary contact. The number of contact hours in this course equals the number of credits the course offers.
- Workload: As a Carnegie I, research-intensive university, UF is required by federal law to assign at least 2 hours of work outside of class for every contact hour. Work done in these hours may include reading/viewing assigned material and doing explicitly assigned individual or group work, as well as reviewing notes from class, synthesizing information in advance of exams or papers, and other self-determined study tasks.
- Accommodation for Student with Disabilities: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the

disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. This class supports the needs of different learners; it is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.

- Statement Regarding Evaluations: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available from the Gatorevals website. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via the evaluation system. Summaries of course evaluation results are available to students at the public results website.

- Statement Regarding Course Recording: Our class sessions may be audio visually recorded for students in the class to refer back to and for use of enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded. If you are unwilling to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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/.

Additional UF Policies and Resources

University Police

The UF police are together for a safe campus. 392-1111 (or 9-1-1 for emergencies) http://www.police.ufl.edu/.

Career Connections Center

Career Connections Center(352-392-1601 |CareerCenterMarketing@ufsa.ufl.edu) connects job seekers with employers and offers guidance to enrich your collegiate experience and prepare you for life after graduation.

Counseling and Wellness Center

Counseling and Wellness Center (352-392-1575) provides counseling and support as well as crisis and wellness services including a variety of workshops throughout the semester (e.g., Yappy Hour, Relaxation and Resilience).

Dean of Students Office

Dean of Students Office (352-392-1261) provides a variety of services to students and families, including Field and Fork (UF's food pantry) and New Student and Family programs

Disability Resource Center

- Disability Resource Center(DRCaccessUF@ufsa.ufl.edu| 352-392-8565) helps to provide an accessible learning environment for all by providing support services and facilitating accommodations, which may vary from course to course. Once registered with DRC, students will receive an accommodation letter that must be presented to the instructor when requesting accommodations. Students should follow this procedure as early as possible in the semester.

Multicultural and Diversity Affairs

Multicultural and Diversity Affairs (352-294-7850) celebrates and empowers diverse communities and advocates for an inclusive campus.

Office of Student Veteran Services

Office of Student Veteran Services (352-294-2948 |vacounselor@ufl.edu) assists student military veterans with access to benefits.

ONE.UF

ONE.UF is the home of all the student self-service applications, including access to:

- Advising
- Bursar(352-392-0181)

- [Financial Aid](#) (352-392-1275)
- [Registrar](#) (352-392-1374)

Official Sources of Rules and Regulations

The official source of rules and regulations for UF students is the [Undergraduate Catalog](#) and [Graduate Catalog](#). Quick links to other information have also been provided below.

- [Student Handbook](#)
- [Student Responsibilities](#), including academic honesty and student conduct code
- [e-Learning Supported Services Policies](#) includes links to relevant policies including Acceptable Use, Privacy, and many more
- [Accessibility](#), including the Electronic Information Technology Accessibility Policy and ADA Compliance
- [Student Computing Requirements](#), including minimum and recommended technology requirements and competencies.

DISCLAIMER

All aspects of course operations, including grading scale, points distribution course policy, and policy execution, are subject to change at the discretion of the course instructor at any time without notice.