CHM2047 — One-Semester General Chemistry — Fall 2013

Credits: 4; Prereq: AP, IB, AICE, or high honors high school chemistry courses, and a high score on the ChRA; Coreq: CHM 2047L.

The course is designed for entering (not transfer) students who wish to move more quickly into advanced course work. Topics include electronic structure and bonding, gases, liquids, solids, kinetics, equilibria, acids and bases, thermodynamics, oxidation-reduction, metals and non-metals.

Instructor	Dr. Alexander Angerhofer
Phone	392 9489 (office, CLB318A) or 392 2123 (lab, CLB303)
E-mail	alex@chem.ufl.edu
O.H.	T-7 (1:55-2:45pm), F-4 (10:40-11:30am) and by appointment, CLB318A or CLB313.

TAs	Kylie Mitchell, all sections, kyliem@ufl.edu, O.H. W-8 (CLB 401), and by appointment.				
	James Fong	Brett Shore	Justin Goodsell	Jacob Renuart	John Shahin
Sections	5636	8007	8010	8020	8023
E-mail	jcf94@ufl.edu	brettshore@ufl.edu	jgoodsell@ufl.edu	renuartsimplepow@ufl.edu	jshahin12@ufl.edu
O.H.	M-5 (CLC*), R-4 (CLC*)	T-9 (CLB 313), F-9 (CLC*)	T-8 (CLB 318), W-7 (CLB 318)	M-9 (CLC*), R-7 (CLC*)	T-E1 (Hume), F-8 (CLC*)

*Chemistry Learning Center, 3rd floor of Keene-Flint Hall Annex, room #258.

Class Meeting Times	T: periods 5+6, R: periods 5+6, 11:45am-1:40pm in Leigh Hall 207			
Discussion Sessions				
5636	8007	8010	8020	8023
W-5, Dau-342	W-4, Lei-142	W-6, Tur-2303	W-3, Tur-B310	W-2, Tur-2303
Holidays	09/02 (Labor Day), 11/08 (Homecoming), 11/11 (Veterans Day), 11/27-29 (Thanksgiving), 12/05-06 (Dead Week, no classes).			
Class Text	Oxtoby, Gillis, Campion, Principles of Modern Chemistry, 7th Edition, Thomson Brooks/Cole, Belmont CA, 2008, ISBN: 0840049315.			
Homework	Homework will be assigned weekly except during weeks of mid-term exams,. Homework will be graded.			
Points Earnable	4 progress exams @ 200 pts. each for 800 pts. total. 1 cumulative final exam (optional) @ 400 pts. For 400 pts total. 10 homeworks @ 50 pts. each for 500 pts. total. 4 online quizzes @ 50 pts. each for 200 pts. total. 1 in-class participation grade (earned with clickers) @ 300 pts. for 300 pts. total 1 in-discussion participation grade @ 200 pts for 200 pts total.. Total earnable points are 2,400 pts, or 2,000 pts without optional final exam.			
Grading Scheme†	With final exam: A: ≥ 2040 pts. (85.0%) 2040 pts > A− ≥ 1980 pts. (82.5%) 1980 pts > B+ ≥ 1920 pts. (80.0%) 1920 pts > B ≥ 1800 pts. (75.0%) 1800 pts > B− ≥ 1740 pts. (72.5%) 1740 pts > C+ ≥ 1680 pts. (70.0%) 1680 pts > C ≥ 1560 pts. (65.0%) 1560 pts > C−‡ ≥ 1500 pts. (62.5%) 1500 pts > D+ ≥ 1440 pts. (60.0%) 1440 pts > D ≥ 1320 pts. (55.0%) 1320 pts > E.		Without final exam A: ≥ 1700 pts. 1700 pts > A− ≥ 1650 pts. 1650 pts > B+ ≥ 1600 pts. 1600 pts > B ≥ 1500 pts. 1500 pts > B− ≥ 1450 pts. 1450 pts > C+ ≥ 1400 pts. 1400 pts > C ≥ 1300 pts. 1300 pts > C− ≥ 1250 pts. 1250 pts > D+ ≥ 1200 pts. 1200 pts > D ≥ 1100 pts. 1100 pts > E.	

Course Schedule (tentative):

† see **https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx** for more info on UF grade policies.

‡ please note that a 'C-' is not considered a passing grade for majors requiring a General Chemistry course.

Date	Day	Chapter	Topic	Reading
08/21/13	W		Discussion: Introduction and Syllabus	
08/22/13	R	4	Introduction to Quantum Mechanics	pp. 139-166
08/27/13	T	4	The Schrödinger Equation	pp. 167-188
08/28/13	W		Discussion: HW #1 is due	
08/29/13	R	5	Atomic Structure	pp. 193-215
09/03/13	T	5	Multi-Electron Atoms and Periodic Trends	pp. 215-231
09/04/13	W		Discussion: HW #2 is due	
09/05/13	R	3	Chemical Bonding	pp. 63 - 107
09/10/13	T	3	Lewis Structures and Molecular Shapes	pp. 107-131
09/11/13	W		Discussion: HW #3 is due	
09/12/13	R	6	Introduction to MO Theory	pp. 235-267
09/17/13	T	6	Valence Bond Theory and Hybridization	pp. 268-303
09/18/13	W	1—6	Discussion: Exam Review, 1st During-Term Exam (during E2-E3 periods, place tba)	
09/19/13	R	7	Hydrocarbons	pp. 307-319
09/24/13	T	7	Aromaticity, Functional Groups, Reactions	pp. 319-343
09/25/13	W		Discussion: HW #4 is due	
09/26/13	R	8	Introduction to Coordination Chemistry	pp. 347-367
10/01/13	T	8	Crystal Field Theory	pp. 367-388
10/02/13	W		Discussion: HW #5 is due	
10/03/13	R	9	Ideal Gas and Kinetic Gas Theory	pp. 395-435
10/08/13	T	12	1st Law of Thermodynamics	pp. 516-542
10/09/13	W		Discussion: HW #6 is due	
10/10/13	R	12	Thermochemistry	pp. 542-563
10/15/13	T	13	2nd Law of Thermodynamics	pp. 571-589
10/16/13	W	6—9,12	Discussion: Exam Review, 2nd During-Term Exam (during E2-E3 periods, place tba)	
10/17/13	R	13	3rd Law of Thermodynamics	pp. 590-607
10/22/13	T	14	Chemical Equilibrium	pp. 613-638
10/23/13	W		Discussion: HW #7 is due	
10/24/13	R	14	Le Châtelier's Principle	pp. 639-658
10/29/13	T	10	Intermolecular Forces	pp. 443-458
10/30/13	W		Discussion: HW #8 is due	
10/31/13	R	10	Phase Equilibrium and Phase Transitions	pp. 459-468
11/05/13	T	11	Colligative Properties of Solutions	pp. 473-509
11/06/13	W		Discussion: HW #9 is due	
11/07/13	R	15	Acid-Base Chemistry	pp. 669-689
11/12/13	T	15	Buffer Solutions and Ordering of Acid Strengths	pp. 689-725
11/13/13	W	10—15	Discussion: Exam Review 3rd During-Term Exam (during E2-E3 periods, place tba)	
11/14/13	R	16	Solubility Equilibria	pp. 733-744
11/19/13	T	16	Solubility and pH	pp. 744-757
11/20/13	W		Discussion: HW #10 is due	
11/21/13	R	17	Introduction to Electrochemistry	pp. 763-822
11/26/13	T	18	Introduction to Chemical Kinetics	pp. 835-855
12/03/13	T	18	Arrhenius Law	pp. 856-881
12/04/13	W	15—18	Discussion: Exam Review 4th During-Term Exam (during E2-E3 periods, place tba)	
12/12/13	R	1—18	Cumulative Final Exam 5:30—7:30pm	

Further Important Information:

1. **Overview and Goals:** CHM 2047/2047L is a one-semester General Chemistry program for entering students with strong backgrounds in chemistry, normally reflected by high AP or IB chemistry test scores. This program allows students to move more quickly into advanced work. The goals of the course are to give an overview of basic chemistry in one semester and to prepare the students for subsequent work (organic, analytical, and physical chemistry).
2. **General Chemistry Learning Objectives:** The course is part of the General Education category and will provide instruction in the basic concepts, theories, and fundamental terms of chemistry and will rely on the use of the scientific method. Major scientific developments will be reviewed and their impacts on society, science, and the environment examined. Focus will be placed on the relevant processes that govern biological and physical systems. Students will formulate empirically-testable hypotheses derived from their study of physical and life processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to predict and evaluate outcomes of experiments. Upon successful completion of CHM2047 each student will:
   - have a working knowledge about the basic concepts, theories, and fundamental terms of Chemistry, and understand the relevant processes that govern chemical systems,
   - grasp the major scientific developments that have led to the current state-of-the-art in the field,
   - be able to assess impacts chemistry has and will have on society, science, and the environment,
   - be familiar with and capable of using the scientific method when discussing scientific facts as they relate to Chemistry,
   - know how to formulate empirically-testable hypotheses derived from the study of physical and chemical processes,
   - apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to predict and evaluate outcomes of experiments.

   To achieve these objectives students are required to actively participate in the following activities:
   - The course offers regular lectures (2 double periods per week) in which the basic concepts of quantum mechanics, thermodynamics, and kinetics will be discussed and applied to simple chemical systems as outlined above. Lecture attendance requires active participation on the students' part. Large sections of class time will be spent in scientific dialog between teacher and students and among the students where they will learn how to develop and prove or disprove hypotheses, how to apply the scientific method, and practice the art of scientific reasoning.
   - One period of small group discussions is held each week in which students will discuss and apply the concepts learned in class. The discussion sessions focus on homework problems and further explore difficult concepts that need additional explanation beyond the lectures. These sessions will be taught by a teaching assistant. Students are expected to participate actively. They will work out homework problems on the board and participate in their discussion. This will not only give students helpful feedback on their own work but also train their logical reasoning skills through scientific criticism and argument.
   - Weekly graded homework assignments typically include up to nine conceptual and numerical problems that require the student to work out the learned concepts through the application of discovery techniques and critical thinking. Example problems are taken from different areas of experimental and theoretical chemistry including physical and life processes. For example, students may be given a series of experimental data points with the charge to come up with empirically testable hypotheses. A tenth graded homework problem includes reading material, typically a topically related original research article. The students are required to explain the major themes, methodologies, results, and conclusions in their own words in the space of 1/2 to 1 letter-sized page. Students are allowed to collaborate on homework but are required to defend their solutions in class on their own.
   - 4 quizzes and 4 mid-term exams will be administered throughout the semester. Due to time constraints they can not be as detailed and time-intensive as the homework problems. Emphasis is placed on testing the students' reasoning skills and their understanding of the material rather than rote memorization of facts. On their exams, students will receive all pertinent equations. They are also allowed a single hand-written page of their own to take into the exams on which they can put any information they consider important. On online quizzes students are allowed to work in groups but will be required to take ownership of their own quiz submission.
   - Participation points are available to students throughout the semester and can be earned both in the lectures and the discussion sessions through active participation in the in-class discussion or through working out problems on the board (for more information see below item #8).
   - Approximately 12 weekly office hours are offered by instructor and TAs, conveniently spread out over the whole week. Students are strongly encouraged to seek help and feedback on all concepts and problems encountered in class. While office hour attendance is completely voluntary it is an important activity that will help solidify students' understanding of the material and make them successful in the course.

3. **Exam Policies:** Four during-term exams will be given (see schedule above). These exams will be evening exams. Exam duration will be approximately 2 hours. Making up a missed exam is a serious and exceptionally burdensome problem. Consequently, a makeup exam will require that you have a legitimate excuse, and that you have brought this to the attention of the instructor before the missed exam. Legitimate excuses include sickness or a conflict with another exam for a higher numbered class. If you are not sure whether your excuse is valid, talk to the instructor before missing an exam. If you have an emergency that prevents you from letting the instructor know ahead of time that you are missing an exam, an excused absence and rescheduled make-up exam will be granted after official documentation about your emergency (doctor's notes, *etc*.) deemed appropriate by your instructor has been presented.
   The final exam is optional. If a student is happy with his/her grade at the end of the semester (see grading scale without final exam above) he/she may skip the final exam. Since the final exam is cumulative, the instructor reserves the right to consider assigning a letter grade above that which the student would receive based strictly on total points earned (as listed above). This will only take effect if the final exam is taken and the performance on the final exam is significantly above the student's performance for the semester, and if the student shows clear improvement in his/her grades over the course of the semester. This qualification cannot lower your grade and will depend on the instructor's evaluation of the student's performance on the final exam.
   A student contending that an exam or quiz has been mis-graded or mis-scored must report this to the TA responsible for grading within one week of receiving the original grade or score. Failure to follow this policy results in no reconsideration of the contended grade or score. For all questions on grades or grading, please consult with the TA first in person. If this does not resolve the issue you may talk to the instructor about it. Except for problems with on-line quizzes (see below), emailed questions on grades or grading will not be answered.
4. **On-line Quizzes:** There will be 4 on-line quizzes (1 quiz = 50 points max.). They will be given through the sakai interface to the class. Quiz durations will be between 30 and 60 minutes depending on the level of difficulty and the number of questions. For your convenience, the web format will allow for an extended period of time (typically an extended weekend) during which you can take the quiz. Once a quiz has been started the clock starts running and you have to finish it in the allotted time. All quizzes may be taken twice with the best result counting toward your grade.
5. **Textbook:** The listed textbook is only one of many reference and study tools you should use to learn chemistry. “Oxtoby, Gillis, Campion, Principles of Modern Chemistry” was chosen because of its combination of scientific rigor and accessibility. Unfortunately, it is also one of the more expensive texts on the market. Feel free to substitute it with the cheaper International Version or the electronic version. There is no need to bring the textbook to class. Occasionally, problems from the book will be used for homework, quiz, or exam problems. Posted reading assignments ought to be completed before coming to class.
6. **Sakai:** You will need to access your e-learning account by following the instructions on the web site, http://lss.at.ufl.edu/ where you will have to supply your Gatorlink ID and password in the appropriate boxes in the login area. Please, log in at your earliest convenience and make yourself familiar with the site. Furthermore, sakai will be primarily used by TAs and instructor to communicate with the class. In the mail settings make sure to set 'Auto Forward Messages' to 'Yes,' and specify an email address you are monitoring on a regular basis. There may also be occasional assignments on sakai that need to be completed before class.
7. **Homework:** Do your homework (HW)! By doing HW problems you will collect essential points toward your grade and will be better prepared to deal with problems on exams. Be ready to work out HW problems on the board during discussion sessions. You will earn up to 40 'participation points' for each HW problem you work out on the board (see item #8 below). You are expected to work out at least three different HW problems throughout the semester for a total of 120 participation points. The remaining 80 participation points may be earned by active participation in the discussion during the W small group sessions. Homework problems come from many different sources, including the instructor's own personal list of problems.
8. **Participation Grade:** Participation points (up to 500) will be earned through active participation in class and in the small group discussion sessions. 200 points can be earned in W discussion session and 300 points can be earned with clickers (see item #9) in class.
   - W Discussion Sessions: 120/200 participation points are reserved for working out HW problems on the board during W discussion sessions. The remaining 80/200 points can be earned through active participation which includes, but is not limited to, responding to questions the TA will ask during class/discussion session, asking questions of the TA or the student working out a HW problem on the board, actively participating in the exam review sessions, etc. Your TA will keep track of your in-class discussion.
   - During Lecture: 300 participation points can be earned by actively participating in class. This is primarily done by using i>clickers to respond to questions asked by the instructor throughout the lectures. You may also earn points by actively participating in the in-class discussion by raising your hand to answer or ask questions of the instructor. In order to obtain credit for verbal participation you will have to sign behind your name on the roster after class.

9. **Clickers:** In this course, you have the option of using i>clicker2 remote, or using i>clicker GO, which enables you to vote via a web-enabled device like a laptop, ipad, or smart phone. The cost of an i>Clicker GO license is $10.- per semester but can be purchased for longer durations at increasing discounts. However, note the following: i>clicker GO cannot be used in a course where your instructor has not enabled i>clicker GO. If you have other courses that use the i>clicker system, check with your other instructors to ensure that i>clicker GO is permitted in each course you take—otherwise, you may want to consider purchasing a remote so that you can use it in all your courses. *Only purchase an i>clicker GO subscription if:*
   - You will not be using i>clicker in another course that does not allow i>clicker GO as an alternative to purchasing a remote.
   - You do not plan to sell back a remote to the bookstore.
   - You have access to a wireless device (*i.e.*, a laptop, iPhone, iPod Touch, or Android) running a browser that supports AJAX, JavaScript, and HTTPS requests (*e.g.*, Internet Explorer, Firefox, Chrome, or Safari). For more info, see: http://www1.iclicker.com/mobile-polling-iclicker-go .

   You are required to purchase an i>clicker 2 remote or i>clicker GO subscription for in-class participation. i>clicker is a response system that allows you to respond to questions the instructor poses during class, and you will be graded on that feedback and/or your in-class participation (i>clicker GO works the same way). In order to receive this credit, you will need to register your i>clicker 2 remote or set up your i>clicker GO account by September 3. If you have decided to use i>clicker GO instead of a remote, please see below for registration instructions.
   - i>clicker 2 remote registration: You must have come to class at least once and voted on at least one question in order to complete this registration properly. Once you have responded to a question with your i>clicker remote, go to http://www.iclicker.com/registration. Complete the fields with your first name, last name, student ID, and remote ID. Your student ID should be your GATORLINK ID**.** The remote ID is the series of numbers and sometimes letters found on the bottom of the back of your i>clicker remote. i>clicker will be used every day in class, and you are responsible for bringing your remote daily.
   - i>clicker GO registration: To create an i>clicker GO account, visit https://iclickergo.com or download the app for iOS or Android. Creating an account automatically starts a free 14-day trial subscription. *Please use this trial period to make sure i>clicker GO will work for all of your i>clicker classes before purchasing a subscription as there are no refunds afterwards.* Once you create your i>clicker GO account, you do not need to do anything else to register. Just be sure that your account has the following profile information:
     a) Student ID: [your Gatorlink ID]
     b) School ZIP/Postal Code: [32611]
     c) School Name: [University of Florida]
     At the end of your trial, should you decide to purchase i>clicker GO, you can purchase access to i>clicker GO in a variety of subscription lengths using your credit card online or through in-app purchase with your smartphone; this subscription includes an unlimited number of courses.

   If you have an activation code from purchasing an access card in the bookstore or from a package with a textbook, you will need to redeem the code from the i>clicker GO website. Once redeemed, the activation will take effect for iOS and Android apps. You cannot redeem access cards from within the iOS or Android apps. To redeem on the website, visit https://iclickergo.com and log into your account . Enter your code from your account profile page if you do not see an entry field upon logging into i>clicker GO.

   If you have more questions on i>clicker registration, please visit http://support.iclicker.com for FAQs and other resources.
10. **Calculators:** You must have your own scientific calculator. Calculators may be used on quizzes and exams but may not be shared. You may **not** use graphing calculators or any calculators that are capable of information storage or communication on any exam. Simple inexpensive scientific calculators such as the TI-30 series or the Casio fx-260 are acceptable and sufficient for any problem encountered on exams.
11. **Class Attendance:** Class attendance is essential for your success in this class. However, we will not do roll-calls. Repeated absence in class and discussion session will make it very difficult to earn full participation points. For further information on UF's attendance policies which are in effect for this course, see: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx .
12. **Study Habits:** The course demands on average 8 – 10 hours/week of work outside of class. Regular lecture attendance is essential. The class will not be taught 'by the book.' It is expected that you read the assigned pages from the textbook (or corresponding chapters in other textbooks) in advance before coming to class. The instructor will build on this material and you are expected to be able to follow in-class discussion. The course demands a regular sustained effort throughout the semester. Most importantly, do not allow yourself to fall behind! The material builds up and you need to stay ahead of the game. If you find that you are not grasping essential material by reading the textbook and following in-class discussion, **seek help!** Visit your instructor's and/or TA's office hours (see above), talk to other students in your class, compare notes, form a study group, consult other text books, go to the CLC (Chemistry Learning Center) in Keene/Flint Hall 258, *etc*.

13. **Students with Disabilities:** Students requiring special accommodations should register with the Dean of Students Office (http://www.dso.ufl.edu/) and present documentation from that office to the instructor.
14. **Counseling Services:** The University of Florida provides counseling services for students, staff, and faculty. See http://www.counsel.ufl.edu/ or call (352) 392-1575 during regular service hours (8am – 5pm). For other hours or weekends call the Alachua County Crisis Center, (352) 264-6789. Students may also call the clinician on-call at Student Mental Health for phone callback and consultation at (352) 392-1161.
15. **Emergency Numbers and Web Sites:**
    - UFPD (UF Police Department): In case of emergency dial 911. The UF campus police non-emergency number is (352) 392-1111. Their web site: http://www.police.ufl.edu/
    - Infirmary (student health center): (352) 392-1161, http://shcc.ufl.edu/
    - EH&S (Environmental Health & Safety): (352) 392-1591, http://www.ehs.ufl.edu/
16. **Cell Phones:** Please put all cell phones or pagers on "**silent mode**" during all class and discussion periods. Thank you.
17. **Facebook Page:** We will need a student volunteer to set up a facebook page for the class. Participating through reading and posting is voluntary but will enhance the course community.
18. **Honors Code:** This class will operate under the policies of the student honor code which can be found at: https://catalog.ufl.edu/ugrad/current/advising/info/student-honor-code.aspx . 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.**

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

Sincerely,

Alexander Angerhofer