

General Chemistry 1306 (CHEM 1306)  
Spring Semester 2016 Syllabus (**subject to revision**)

Begin studying chemistry as soon as you read this and keep studying chemistry for at least 30 minutes of quality study time every day (many of you will need more study than this!) until Tuesday, May 10<sup>th</sup> and you can succeed in this course. You will find this a challenging course and you must study to succeed.

This course requires a thorough and complete understanding of every concept from first semester general chemistry. If you do not understand the concepts from first semester general chemistry, you will not be successful in this course. CHEM 1306 is the second half of General Chemistry, an introduction to the fundamentals of chemistry for scientists, engineers and pre-professional students and builds on the concepts from CHEM 1305.

Mathematics 1508 (pre-calculus), Chemistry 1305 and its laboratory, CHEM 1105, are **absolute prerequisites** for this course and must be completed with passing grades of C-or-better before enrolling in CHEM 1306. Mathematics 1508 **cannot** be taken concurrently with CHEM 1306. The laboratory, CHEM 1106, is a co-requisite for everyone but some engineering majors. Workshop is an essential component of CHEM 1306.

**Required course Materials:**

1) The **Peer-Led Team Learning Workbook, Second Semester General Chemistry, Spring 2016** edition, ISBN 978-1-943668-02-1, is **required**. The sole source for this Spring 2016

Resource Book is the UTEP Bookstore.

2) Apperson<sup>TM</sup> Grading forms must be purchased for Hour Exams. The forms are available from the ACS office in CCSB (across from the Department offices) among other locations. These forms will be required during the Hour-long exams.

**Recommended Course Materials:**

1. Optional Textbook: **Chemistry**, by Raymond Chang, 10th Edition, McGraw-Hill Science. Any newer or any older version of this textbook may also be used for this course. It is the student's complete responsibility to resolve any content differences (e.g. problem number differences) among the editions.
2. Optional Textbook: **Chemistry**, OpenStax.com, ISBN **978-1-938168-39-0**. Download for free at <http://cnx.org/content/col11760/latest/>.

**Curriculum** Chemistry 1306 begins with a review of molecular structure, Chapters 8 – 10 in **Chemistry**, tenth Edition, by Raymond Chang, McGraw-Hill Publishers, [www.mhhe.com](http://www.mhhe.com). A newer edition is now available, but is not required. The primary content of CHEM 1306 is the material contained in Chapters 24, 11 – 16, and 18 – 19 of Chang. Earlier editions of Chang such as the eighth and ninth editions may also be used for this course, but it is the student's responsibility to reconcile any differences. CHEM 1306 is rigorous and demanding and should not be attempted without adequate mathematical preparation. No student should attempt this course without a mathematical proficiency equivalent to that of a student who has just mastered pre-calculus. Any subsections in the text which are not to be examined will be so indicated by the professor; however, reading all sections in each chapter is to your advantage. This semester we will cover chapters in the following sequence:

8- 10. Review of Lewis Structures, Molecular Bonding and Geometries. This includes consideration of resonance, formal charge, bond angles, molecular shapes, hybridization, bond enthalpies, polarity, sigma and pi bonding.

24. Carbon and Organic Chemistry
11. Intermolecular Forces, Liquids, and Solids
12. Physical Properties of Solutions
13. Chemical Kinetics
14. Chemical Equilibrium
15. Chemistry of Acids and Bases
16. Acid-Base Equilibria and Solubility Equilibria
18. Entropy, Free Energy, and Equilibrium
19. Electrochemistry

[Small differences in coverage, content understanding, expectations, and grading may occur for the two sections taught by the different instructors. These will be explained in class.]

**Final Examination Tuesday, May 10, 2016, 7 a.m. – 9:45 a.m. No exceptions.**

### **Instructor Information**

Instructor: Dr. Mahesh Narayan (747-6614)  
 Section Number: 21374  
 Location: UGLC 128; MW 8:30 – 9:20am  
 Instructor's Office: CCSB 2.0202  
 Office Hrs: MW 9:30 – 10:30 or by appt.  
 E-mail: mnarayan@utep.edu

Instructor: Dr. James E. Becvar (747-7563)  
 Section Number: 21375  
 Location: UGLC 116, TR 7:30 – 8:50  
 Instructor's Office: PSCI 409  
 Office Hours: TR 9:15 - 11:30 or by appt.  
 E-mail: jbecvar@utep.

### **Learning Goals and Student Outcomes**

Students completing this course will have a clear understanding of the chemical and physical basis for spontaneity, an appreciation for properties of aqueous solutions and reactions including the characteristics of acids and bases, an understanding of rates of reaction, solubility, electrochemistry, and a structural understanding of simple organic substances. CHEM 1306 Workshop will require students to:

- Practice asking (and answering) meaningful questions (of the why? and how?) nature
- Learn how to work successfully in teams to solve challenging chemical problems
- Learn how to argue persuasively but respectfully about chemical concepts
- Practice oral report out to the entire Workshop, thus gaining confidence in public speaking.

### **Unexcused Absence Policy**

An unexcused absence means an absence of an enrolled student from class without **PRIOR** arrangement with the course professor. Any unexcused absence from an Hour Exam is grounds for being administratively dropped from the course. A cumulative total of more than three unexcused class absences during the Spring 2016 semester is grounds for being dropped from the course.

### **Lecture Schedule**

Listed below are the tentative dates for the TR class periods this term along with the approximate lecture material for that date. The MW class will parallel this schedule. For example Tuesday 19-Jan: 8-9 (Review) means that the course content covered in lecture on Tuesday, January 19, 2015 will be a review of content from Chapters 8 & 9 from Chang. (The following schedule is subject to revision.)

**Lecture Schedule:**

Tuesday	Chapter	Thursday	Chapter
19-Jan	8,9 (review)	21-Jan	10(review)
26-Jan	10,24	28-Jan	24
2-Feb	24	4-Feb	<b>Exam I</b>
9-Feb	11	11-Feb	11,12
16-Feb	12	18-Feb	12,13
23-Feb	13	25-Feb	13
1-Mar	13	3-Mar	<b>Exam II</b>
8-Mar	Spring Break	10-Mar	Spring Break
15-Mar	14	17-Mar	14
22-Mar	14	24-Mar	15
29-Mar	15	31-Mar	15
5-Apr	15/16	7-Apr	<b>Exam III</b>
12-Apr	16	15-Apr	16/18
19-Apr	18	21-Apr	18/19
26-Apr	19	28-April	19
3-May	Review	5-May	<b>Exam IV</b>

**This schedule is subject to revision. Exam dates may change. The dates of coverage shown above are subject to change.**

**Prerequisite Understanding**

As a result of successful completion of the first semester of general chemistry (CHEM 1305), every student attempting this second semester course (and having only a periodic table and a non-programmable calculator available) should be able to:

- Determine numbers of protons, neutrons, and electrons in atoms and ions
- Determine charges of monatomic ions based on the position of the atoms in the periodic table
- Write formulas and give correct IUPAC names for compounds containing any metal and any non-metal in the periodic table.
- Write formulas and give correct IUPAC names for compounds containing any metal in combination with common polyatomic anions, where these common polyatomic anions contain atoms of hydrogen, nitrogen, carbon, phosphorus, sulfur or chlorine.
- Write formulas and calculate molar amounts of common substances such as water, ammonia, elemental gases, common acids and bases, common nonmetal compounds (e.g. carbon monoxide, sulfur dioxide), simple organic compounds.
- Give balanced acid-base reactions to produce the compounds mentioned above.
- Give balanced redox reactions to produce the compounds mentioned above.

- Use the periodic table to calculate the number of moles in 20.0 g (or any other mass) of compounds mentioned above.
- Create problems and solve them involving the calculation of molarities by forming solutions, making dilutions, or in acid-base titration problems.
- Use mass percentages to determine empirical formulas of compounds.
- Create problems and solve them using common gases and the ideal gas law; for example, solve for any of the variables in the ideal gas law if values for the other variables are known.
- Apply Dalton's Law to solve for partial pressures of gases in gas mixtures.
- Explain the electron configuration and orbital box diagram for any monatomic atom or ion.
- Discuss shapes, hybridization, molecular and geometric properties of simple substances such as those mentioned above.

### **Expectations for this Course:**

- Every student will be mentally engaged in every lecture and every Workshop session.
- BEFORE class each day every student will:
  - Read the appropriate pages in the textbook identified in the **Lecture Schedule** above and from the material covered in the previous lecture and
  - Practice, practice, practice answering questions and appropriate problems from the text such as the worked Examples in the text, the Practice Exercises after the Examples, End-of-chapter Questions and Problems, and Homework Problems.
- BEFORE class each day every student will complete any homework and any quiz assigned for that lecture.
- Students will attend extra sessions and/or office hours given by Peer Leaders and
- And did we mention attending every lecture and Workshop and studying every day?

**Hour Examinations.** The listed hour examination dates and content coverage are subject to change. Four one-hour examinations are scheduled. The first hour examination covers material from chapters 8 – 10 and Chapter 24; the second covers material from Chapters 24 and 11 - 13, but may include questions from chapters 8 - 10; the third hour examination covers material from Chapters 14 and 15, but may include questions from previously covered chapters; the last hour examination covers material primarily from Chapters 16, 18, and 19, but may include questions from all previous chapters. **No cell phones, beepers, or other electronic devices may be on or used during examinations inside or outside the examination room.** Any student found using an electronic device during an examination will receive a grade of zero on the examination. No ball caps or hats may be worn during examinations.

Bring a **photo identification card** to **all** examinations to display when turning in your examination. You may use only a **non-programmable** calculator (i.e. a calculator not capable of retaining equations or words) during the hour examinations and the final examination. **Do not bring programmable calculators to the examinations.** Anyone found using a programmable calculator will be given a zero for the examination. A satisfactory calculator (which can perform logarithmic and exponential operations needed for CHEM 1306) can be purchased for less than \$15. If you cannot afford to purchase one, then borrow one or see your instructor.

CHEM 1306 examination questions are designed to test: **i)** understanding of basic concepts and **ii)** familiarity with chemical nomenclature, usage and calculations. Examinations emphasize problem solving as opposed to memorization. You are well advised to learn the **process** involved in problem

solving rather than memorization of specific facts. The dates for examinations shown above in the class schedule are subject to change. Valid absences for University related activities (e.g. out-of-town research presentations, sporting events) must be arranged with the instructor **prior** to the date of the respective examination. No provision exists for make-up of examinations missed as a result of unexcused absences; students will receive a grade of zero for missed examinations. [Small differences in coverage, content understanding, expectations, and grading may occur for the two sections taught by the different instructors. These will be explained in class.]

### **Formative Assessment of Readiness (FAR)**

Student understanding of chemistry during the course **may** be evaluated **daily** using a 'Team-Based Learning (TBL)' strategy called Formative Assessment of Readiness. Results will be posted to Blackboard. The FAR Examination process uses individual and team assessments administered during each lecture. **Do not bring programmable calculators to class to use during the Formative Assessment of Readiness Examinations.** The process of FAR Examination requires that you keep up-to-date and on your toes and attend every lecture. You must read the text and review your notes before **each and every** class; that means you must be responsible for your own learning on a very **regular** and progressive basis. This Syllabus describes the chapter schedule for each class day. Read the text, work problems, and understand the concepts behind them.

The FAR format of assessment is much more akin to the experience you all face once you finish college; in the real world you must be prepared every single workday. Some FAR Exams will be smaller; some will be bigger. By the end of the course, you are to have full command of the material for second semester general chemistry.

**Workshop:** Workshop is a **required** component of CHEM 1306. Students enrolled in a 1306 Lecture section also **must** be co-enrolled in a Workshop section; no exceptions. **There are 20 Workshop sections for CHEM 1306 in Spring 2016. Workshop is NOT the same as CHEM 1106 Laboratory. Workshops for the Spring 2016 semester will begin the week of January 19 (first week of classes).** The **General Chemistry II Workbook for SPRING 2016**, ISBN 978-0-943668-02-1, must be brought to every workshop and will be examined by the Peer leader. Assignments from within the Workbook will be assessed during workshop. Each Workshop meets for a two-hour period, is overseen by a Peer Leader, and has a grading policy based on participation and involvement. Approximately 15% of the course grade is represented by participation in Workshop, but Workshop is required to pass CHEM 1306. Absence, tardiness, or leaving early from Workshop **results in grade reduction** in the overall CHEM 1306 grade. The Workshop format allows the Peer Leaders to use active learning techniques to enhance understanding of chemical principles, to provide hands-on exposure to qualitative, descriptive chemistry activities (Explorations), and to give practice with problem solving methods. Goggles (you must provide them and bring them to Workshop each week) **must** be worn during chemical Explorations (laboratory exercises).

**Homework and Quizzes:** Homework assignments will be issued. Quizzes may be given periodically to assess whether students are up to date in understanding. Homework (a separate grade from the Workshop grade) will represent 15% of your course grade. Your section instructor will provide instructions on due dates for Homework. Please be very mindful of the homework due dates as they will not be changed, unless extreme and unforeseen circumstances arise.

**Peer Leaders:** There are fifteen Peer Leaders (PLs) facilitating the learning in the CHEM 1306 Workshop Program this semester. Please see **any** PL if you need help in this course, not just the PL in charge of your specific Workshop section. Many of the PLs will attend each lecture so you can get to know them. Discuss problems, questions, concerns with **any** PL. PLs will also conduct review sessions prior to the Hour Examinations and Final Examination.

**Final Examination:** By University edict, everyone taking this CHEM 1306 course must take the final examination at the time specified, Tuesday, May 10, 2016 at 7 a.m., no exceptions. [Please note this is not the scheduled time for courses offered MWF at 8:30 nor courses offered TR at 7:30.] You may use only a **non-programmable** calculator during this examination. The second semester examination consists of the standardized American Chemical Society second semester general chemistry examination. The questions are multiple-choice. This examination covers the entire curriculum for the second semester course. Approximately 30% of your total grade will be based on your final examination score. Both sections of CHEM 1306 take the final examination on **Tuesday, May 10, 2016, between 7:00 - 9:45 AM (probably in the Undergraduate Learning Center).**

**NO CELL PHONES, BEEPERS, IPODS, CD MACHINES OR ANY OTHER ELECTRONIC DEVICES MAY BE ON OR USED DURING THE HOUR, FAR, OR FINAL EXAMINATIONS INSIDE OR OUTSIDE OF THE EXAMINATION ROOM.**

Any student found using an electronic device during the final examination will receive a grade of zero on the examination. No **caps** or **hats** may be worn during the hour or final examinations. Bring a **photo identification card** to display in order to turn in your examination. You may not use a **programmable** calculator (i.e. a calculator capable of retaining equations or words) during any examination. Anyone found using a programmable calculator will receive a grade of zero. You can purchase a satisfactory calculator which can perform logarithmic and exponential operations (needed for CHEM 1306) for less than \$15 at many stores. If you can not afford to purchase one, then borrow one.

### **Study Objectives**

Take the time to read the Preface to your textbook. The Chang text comes with a wealth of WEB-based learning materials and problem solving tools. Take advantage of them; find out what works best for you. **You need to prepare yourself for answering any problem of a given type, not just problems you have seen before.** The key to mastering chemistry is not the accumulation of many facts (i.e. memorization), but the integration of chemical concepts into an understanding of the subject. Spend time thinking about **why and how** something works the way it does, rather than what is the name, number, i.e. factoids to memorize. Form cooperative, active study groups with 2-3 other students, perhaps some of your fellow students from your Workshop section.

Homework assignments, Quizzes, and Study Recommendations may be given as a component of the lecture and Workshop sections of the course. You are strongly urged to work most of the problems at the end of each chapter. Within the text the author delineates worked **Examples** and **Exercise** questions, some answered, some not. Generally speaking, the more problems you can solve without referring to a worked solution or the text, the better your understanding of the material. Important terms appear in **bold font** in the text and are listed alphabetically in the Index/Glossary. Building a scientific vocabulary is largely memory work. You should feel free to ask your lecturer and Peer Leader about specific terms that you do not understand. The textbook gives a clear presentation of the major concepts and of the procedures used for problem solving. You are encouraged to ask questions of your lecturer and Workshop peer leaders both

during class and tutorial hours and to fully utilize the tutorial services on campus, e.g. the ACES Centers. Many students have found these services to be very helpful. You are not alone in the pursuit of chemical understanding.

**Grades (subject to revision):** Letter grades for the CHEM 1306 course are assigned on the basis of your total score earned for the semester. The tentative grading scheme is based on the following calculation: **A) Final** examination (comprehensive) score (30%), **B) Workshop** (15%), **C) Homework/Quizzes** (15%), and **E) Hour Examinations** (40 %). Four Hour Exams offer possible scores to choose from for the ‘best three’ scores to use for this 40% portion of your grade. We may offer an alternative option during the semester. The exact cut-off scores for each letter grade in 1306 will be determined at the end of the semester, but often follows a pattern something like 70%, 80%, and 90% for grades of C, B, and A. (This grading scheme is subject to revision during the semester.) [Small differences in coverage, content understanding, expectations, and grading may occur for the two sections taught by the different instructors. These will be explained in class.]

**Blackboard** Announcements will be made using **Blackboard**. Make sure you check **Blackboard** often.

**Course Withdrawal Policy** “Classes dropped **prior** to the official **census date** of any term (this term: February 3, 2016) will be deleted from the student’s semester record.” After this date, the University permits any student to drop with an automatic “W” until Friday, April 1, 2016. **Repeat:** The UTEP Spring 2016 drop deadline is April 1, 2016. *The College of Science will remain aligned with the University and not approve any drop requests after April 1, 2016.*

#### **Prerequisites for CHEM 1306**

In order to be enrolled in Chemistry 1306, you must have:

- i) Passed Math 1508 with a grade of “C” or better (Or have achieved an SAT Math score of 600 or better.
- ii) Passed CHEM 1305 (or the equivalent) with a grade of “C” or better

**Student Major:** The CHEM 1305 - 1306 sequence is designed for students who are majoring in a field of science or engineering.

**Laboratories:** CHEM 1106 is a separate course from CHEM 1306. Workshop is an integral part of CHEM 1306. The content for CHEM 1106 laboratory will be integrated with the material covered in lectures and Workshop in CHEM 1306. The laboratory is highly recommended for all students regardless of major.

**Disability:** **If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).**

**Secretarial Services:** The office of the general chemistry secretary, Lucema Armenta, is now located in the new Chemistry and Computer Science Building. A bulletin board placed outside of the secretary’s office contains all necessary information regarding exams, solutions to problems, etc. It is to your advantage to check the board frequently for information. Office hours are from 8:00 am to 12 noon and the 1:00 PM - 5:00 PM; **the office is closed for lunch (12 noon - 1:00 PM) and the secretary is unavailable during this lunch hour period.**

**Personal Protective Equipment.** **The Workshop for this course includes some hands-on ‘wet’ chemistry experiments conducted in a laboratory. You will need to acquire and use your own goggles and lab coats. You must bring your goggles and lab coats to your CHEM 1306 Workshop each session.** The Student Affiliates of the American Chemical Society sell goggles. State law requires that goggles be worn if a student is working in laboratory for this class. Ask your peer leader about this if you are interested in purchasing goggles.