

Syllabus (subject to revision)

General Chemistry 1306 (CHEM 1306) Fall Semester 2023 The University of Texas at El Paso

Instructor Information

Instructor: Dr. Mahesh Narayan (747-6614)
Section Number: 13125
Location: UGLC 116, MWF 1:30 – 2:20pm
Instructor's Office: CCSB 2.0202
Office Hours: by email appointment only
E-mail: mnarayan@utep.edu

Instructor: Dr. James E. Becvar (747-7563)
Section Number: CRN 13124
Location: UGLC 126, TR 7:30 – 8:50 am
Instructor's Office: PSCI 409
Office Hours: by email appointment only
E-mail: jbecvar@utep.edu

CHEM 1306 is a very difficult course. CHEM 1306 is a very difficult course. Lectures, workshops, and exams for the course will be in person. Make sure you satisfy the pre-requisites: 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. CHEM 1306 is the second half of General Chemistry, an introduction to the fundamentals of chemistry for scientists, engineers, and pre-professional students. This second course in general chemistry is significantly more challenging for most students than first semester and builds on the concepts from first semester general chemistry, CHEM 1305. Our expectation is that you know the concepts and content from first semester general chemistry.

This course requires a thorough understanding of the concepts and content from first semester general chemistry, CHEM 1305. Many students do not understand these concepts and know-how from first semester general chemistry and struggle in CHEM 1306 as a result. Some students do not possess the mathematical proficiency needed for success in CHEM 1306. The Workbook for this Fall 2023 course contains a Special "Handbook for Mathematics Needed for CHEM 1306" success. If your grade in first semester was not an A – or if you took that course more than a semester ago, you may find this course exceedingly difficult. Review concepts from first semester general chemistry from day one of the semester. Many students do very poorly in (withdraw or fail) this CHEM 1306 course because they do not bring an understanding of first semester general chemistry with them. Mathematics 1508 **cannot** be taken concurrently with CHEM 1306. If you received a grade of C in CHEM 1305, you will have grave difficulty with examinations in CHEM 1306.

The laboratory, CHEM 1106, is a co-requisite for everyone but some engineering majors. CHEM 1306 Workshop is an essential component of CHEM 1306 and is not the same as CHEM 1106, a separate laboratory course. **Be sure you read and understand the sentences above.** Begin studying chemistry as soon as you read this and keep studying chemistry for at least one hour of quality study time **every day** (many of you will need two hours of study time daily) until Tuesday, December 12, 2023, in order to succeed in this course. You will find this a challenging course and you must study to succeed.

Unexcused Absence Policy

An unexcused absence means an absence of an enrolled student from class or workshop 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 semester provides grounds for administratively being dropped from the course. Workshop attendance is mandatory. No exceptions.

COVID-19 PRECAUTION STATEMENT

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

Required Material

1) *Second Semester General Chemistry by Exploration, Fall 2023*, ISBN 978-1-943668-34-2. This Workbook is required. There are two choices for purchasing the workbook. One is the UTEP Bookstore (for something like \$129.50 plus tax). The other is online at PLTLbooks.org, for a lower price.

Optional Course Material

Optional Textbook: *Chemistry*, by Raymond Chang, 10th Edition, McGraw-Hill Science. Any used copies between the 8th to 12th editions of this textbook may be used for studying for this course. It is the student's complete responsibility to resolve any content differences among the editions. Used copies of this excellent text can be found on-line, often at prices below \$20, depending on availability.

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 30 Workshop sections for CHEM 1306 for Fall 2023. Workshop is NOT the same as CHEM 1106 Laboratory. Workshops for the Fall 2023 semester begin August 29 (first week of classes).** Each Workshop meets for a two-hour period, is overseen by a Peer Leader, and has a grading policy based on participation and involvement. All workshops in Fall 2023 meet in person. Approximately 20% of the CHEM 1306 course grade is represented by participation in Workshop; 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).

The workbook entitled *Second Semester General Chemistry by Exploration, Fall 2023*, ISBN 978-1-943668-34-2, must be brought to every online workshop session and will be utilized by the Peer Leader. Homework assignments from the Workbook will be made and problems from the Workbook will be assessed during workshop.

Homework

Homework from the Workbook will be issued and contribute to your course grade this term. Your Workshop Peer Leader may provide additional instructions for homework. Please be very mindful of the homework due dates as they will not be changed.

Curriculum

Chemistry 1306 begins with a review of molecular structure, Unit I, Module 1 in the Workbook, *Second Semester General Chemistry by Exploration*, Fall 2023. The primary content of CHEM 1306 is the material contained in the Workbook. This course is the second semester of the two-semester sequence in general chemistry at UTEP. CHEM 1306 is mathematically 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 well mastered pre-calculus (MATH 1508 is a **required** pre-requisite). 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 content in the following sequence:

Week 1 from the Workbook, *Second Semester General Chemistry by Exploration*, Fall 2023 is Review; especially The Mole, Naming of Anions and Acids.

Week 2, Molecular Structure and Bonding includes consideration of resonance, formal charge, bond angles, molecular shapes, hybridization, bond enthalpies, polarity, sigma and pi bonding.

Week 3. Organic Chemistry and Reactions

Weeks 4 – 14 will be sequenced as discussed in class lecture.

Final Examination In Person, Tuesday, December 12, 2023, 7 a.m. – 9:45 a.m. No exceptions.

Peer Leaders

There are twenty-seven 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 some of the Examinations.

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 chemical 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.

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 50.0 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** in this syllabus 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?

Study Objectives

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 1306 Workshop section; perhaps students you know from CHEM 1305 or CHEM 1306 lecture.

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 Workbook Week and find extra problems in other textbooks. Within many texts the authors delineate worked **Examples** and **Exercise** questions, some answered, some not. Generally speaking, the more problems you can solve without referring to a worked solution or to the textual material, the better your understanding of the content. Important terms often appear in **bold font** in textual material and are often

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 Workbook 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 during class, workshop, and tutorial hours. You are not alone in the pursuit of chemical understanding.

Fall 2023 Lecture Schedule (The sequence and exam schedule below is subject to revision)

Listed below are the dates for the CHEM 1306 TR class periods this term along with the approximate, tentative lecture material for those dates. For example, the classes on Tuesday, August 29 and Thursday, August 31 will consider content from Module 1 of the Workbook *Second Semester General Chemistry by Exploration, Fall 2023*, ISBN 978-1-943668-34-2. This is review of CHEM 1305 and covers material from approximately page 17 to page 32 in this Workbook.

TR Lecture Schedule Fall 2023. Subject to Change. Page numbers approximate.

Tuesday	Topics	Thursday	Week
29-Aug	Module 1 Moles, Rule of Seven; Molarity, Lewis Structures pp. 17 – 32	31-Aug	Module 1, 2 VSEPR, Resonance, Molecular Geometry pp. 24 - 41
5-Sep	Module 2 Molecular Geometry, Hybridization pp. 42 – 47	7-Sep	Module 3 Organic Chemistry pp. 48 - 56
12-Sep	Module 3 Organic Reactions pp. 57 – 70	14-Sep	Exam I
19-Sep	Module 4 Intermolecular Interactions; Phases pp. 73 – 76	21-Sep	Module 4 Phase Diagrams pp. 77 - 91
26-Sep	Module 5 Properties of Solutions	28-Sep	Module 5 Colligative Properties pp.
3-Oct	6 Plotting Reactions pp. 117 – 133	5-Oct	6 Kinetics pp. 134 - 156
10-Oct	7 Rate Laws pp. 157 – 173	12-Oct	Integrated Rate Laws Arrhenius Theory
17-Oct	Exam II	19-Oct	8 Equilibrium, K, and Q pp. 175 – 184
24-Oct	8 Le Chatelier's Principle pp. 185 - 194	26-Oct	9 Acids and Bases, K _a , K _b pp. 195 – 200
31-Oct	9 ICE Tables pp. 201 – 212	1-Nov	10 Polyprotic Acids pp. 213 – 220
7-Nov	10 Buffers pp. 227 – 241	9-Nov	11 Titrations pp. 243 – 253
14-Nov	Exam III	16-Nov	12 Solubility and K _{sp} pp. 254 - 271
21-Nov	13 Thermodynamics pp. 272 – 279	23-Nov	Thanksgiving
28-Nov	13 Free Energy, Standard State pp. 286 – 299	30-Nov	14 Redox pp. 286 – 299
5-Dec	14 Electrochemistry pp. 300 - 323	7-Dec	Exam IV

This schedule is subject to revision. Exam dates may change.

Study Objectives

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 1306 Workshop section; perhaps students you know from CHEM 1305 or CHEM 1306 lecture.

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 Workbook Week and find extra problems in other textbooks. Within many texts the authors delineate worked **Examples** and **Exercise** questions, some answered, some not. Generally speaking, the more problems you can solve without referring to a worked solution or to the textual material, the better your understanding of the content. Important terms often appear in **bold font** in textual material and are often 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 Workbook 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 during class, workshop, and tutorial hours. You are not alone in the pursuit of chemical understanding.

Hour Examinations

The listed hour examination dates and content coverage in the course schedule on page 5 of this Syllabus are subject to change. Four one-hour examinations are scheduled. On-line examinations, if used, may require the Respondus Lockdown Browser. **Your performance on the best three of these Hour Examinations represents 50% of your final grade.** The first hour examination covers material from Weeks 1 – 3 including Organic Chemistry; the second covers material from Weeks 4 - 8 but may include questions from Weeks 1 - 3 and Organic Chemistry; the third hour examination covers material from Weeks 8 - 11 but may also include questions from previous material; the last hour examination covers topics primarily from Weeks 12 - 14, but may include questions from all previous Weeks.

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 any missed Examination.

Final Examination

By University edict, **everyone** taking this CHEM 1306 course must take the **in-person** final examination at the time specified: Tuesday, December 12, 2023, at 7 a.m. to 9:45 a.m., no exceptions. This time is specified in the final examination schedule for UTEP. **This time is NOT the time corresponding to the day and hour of your class.** This examination will cover 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 in person on **Tuesday, December 12, 2023, between 7:00 - 9:45 AM.**

Grades (this process is subject to revision)

Grades earned in this course are largely (80%) determined by your performance on examinations. 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** and **Homework** (20%), and **C) Hour Examinations** (50 %). 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.)

Statement from the UTEP Registrar

Exemption from the final examination may not be given. Final examinations are scheduled to be two hours, forty---five minutes in length and take place during the final examination period. It is the policy of the university not to administer a second final examination in the course. It is also university policy that students shall not have more than two final examinations in a single day. In the unlikely event that the examination schedule results in a student having three final examinations on a single day, the faculty member upon the request of the student shall reschedule the **second** of that student's three examinations.

Academic Honesty

Materials (written or otherwise) submitted to fulfill academic requirements must represent every student's own personal, individual efforts. This refers to help with homework, assignments, or examinations. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Violations will be taken seriously and will be referred to the Dean of Students Office for possible disciplinary action.

Blackboard

Announcements will be made using **Blackboard**. Make sure you check **Blackboard** often. Blackboard contains all necessary information regarding exams, solutions to problems, etc. It is to your advantage to check Blackboard frequently for current information.

Course Withdrawal Policy

"Classes dropped **prior** to the official **Census Date** of any term (this term: September 13, 2023) will be deleted from the student's semester record." The fall 2023 official Drop/Withdrawal date is November 3, 2023. After this date, the official policy of the University is:

Student-initiated drops are permitted after this date, but the student is not guaranteed a grade of W. The faculty member of record will issue a grade of either W or F.

Prerequisites for CHEM 1306

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

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

Laboratories

CHEM 1106 is a separate course from CHEM 1306. Workshop is an integral part of CHEM 1306.

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, 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.

Copyright Statement for Course materials

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

Course Resources: Where You Can Go for Assistance

UTEP provides a variety of student services and support:

Technology Resources

- **Help Desk**: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources

- **UTEP Library**: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- **Math Tutoring Center (MaRCS)**: Ask a tutor for help and explore other available math resources.
- **RefWorks**: A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

Individual Resources

- **Military Student Success Center**: Assists personnel in any branch of service to reach their educational goals.
- **Center for Accommodations and Support Services**: Assists students with ADA-related accommodations for coursework, housing, and internships.
- **Counseling and Psychological Services**: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.