Sample Syllabus
Chemistry 1345

Instructor:


Course Prerequisites: This course is intended for non-science majors. CHEM 1345 cannot be used to fulfill the 1441/1442 requirement in any degree program.

The course teaches the underlying principles of matter in five principles:
Who is who: Elements and their atoms as the principle building blocks of matter;
Elective affinities: attractions and repulsions between atoms, molecules and ions determine the properties of materials and their rearrangement changes the character of matter;
Speed dating: the details of encounters (collisions) between atoms and molecules determines the speed of reactions;
Hot tempered or cool cucumber: the role of energy in chemical reactions
Temporary relationships: bonds and attractions are constantly formed and broken

The course consists of two components: 1. a lecture part with demonstrations and small group projects and 2. a lab component with traditional and inquiry based explorations.
CHEM 1345, 1346 cannot be used to fulfill the 1441/1442 requirement in any degree program.

The objectives will be assessed through communal assessment using signature assignments (this includes all sections of the course)

1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.

The signature assignment will be a guided inquiry laboratory experiment. Students will develop an understanding of standard chemical separation techniques in the lecture. Groups of 2-3 students will then apply their knowledge to design a laboratory procedure to separate a mixture of 4 different compounds of (to them) unknown composition.

2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication.

The teams will design their procedure as a homework assignment. A detailed written version of their proposed experiment will be assessed and revised by the lab supervisor. After the team conducted the experiment they present their procedure and their results, including a detailed discussion of error sources in their experiment, on whiteboards in front of their peers. Individual written lab reports will conclude the experiment.

3. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

The inquiry base of the lab exercise necessitates extensive teamwork between the members of each lab team in different ways. Students need to find ways to communicate in self-determined settings and within a narrow time window:

   a) Outside the classroom during the design phase of the exercise (e.g. through social media, meetings etc.).
   b) During the laboratory work itself: time management, assignment of tasks within the group and practical "hand-in-hand" work.
   c) Preparation of the final peer presentation: discussion of results, assignment of tasks within the group under time constraint.

4. Empirical & Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

Part of the grade of the assignment will be based on the precision with which the mass composition of the mixture will be determined during the experiment. A detailed error discussion will be part of the final written lab report.
Student Learning Outcomes:

- understand fundamental chemical concepts, including atomic and molecular structure, chemical bonding, some chemical reactions, the relationship of the electronic structure of elements to the periodic table, and periodic physical and chemical properties of elements and compounds.
- perform basic quantitative calculations related to chemical stoichiometry, (empirical and quantitative skills)
- learn the scientific process by designing and conducting experiments, collecting and analyzing data, and presenting results, in both written and oral formats (critical thinking, communication)
- learn essential laboratory procedures and protocols (teamwork)
- Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information;
- Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication
- Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

The Signature Assignment for satisfying the Core Curriculum Requirement will be an inquiry based lab experiment for the separation of a 4-compound mixture.

Tentative lecture schedule:

<table>
<thead>
<tr>
<th>week #</th>
<th>Lecture material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>orientation and chapter 1: About Science</td>
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<tr>
<td>2</td>
<td>chapter 2: Particles of Matter</td>
</tr>
<tr>
<td>3</td>
<td>chapter 3: Elements of Chemistry</td>
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<tr>
<td>4</td>
<td>chapter 4: Subatomic particles</td>
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<tr>
<td>5</td>
<td>chapter 5: The Atomic Nucleus</td>
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<tr>
<td>6</td>
<td>chapter 6: How Atoms Bond</td>
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<tr>
<td>7</td>
<td>chapter 7: How Molecules Mix</td>
</tr>
<tr>
<td>8</td>
<td>chapter 8: How Water Behaves</td>
</tr>
<tr>
<td>9</td>
<td>chapter 9: How Chemicals React</td>
</tr>
<tr>
<td>10</td>
<td>chapter 10: Acids and bases in our Environment</td>
</tr>
<tr>
<td>11</td>
<td>chapter 11: Oxidations and Reductions</td>
</tr>
<tr>
<td>12</td>
<td>chapter 12: Organic compounds</td>
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<tr>
<td>13</td>
<td>Chapter 13: Nutrients of Life and Chapter 14: Medicinal Chemistry</td>
</tr>
<tr>
<td>14</td>
<td>Chapter 15: Optimizing Food Production and Chapter 16: Protecting Water and Air Resources</td>
</tr>
<tr>
<td>15</td>
<td>Chapter 17 Capturing Energy</td>
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</tbody>
</table>

Dropping the Course: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Paperwork: When dropping the course, you are responsible for seeing that all of the proper paperwork is completed and submitted to the appropriate university officials. If this paperwork is not completed, you will receive a letter grade corresponding to your earned grade, including zeros for all missed work.

Grading:

<table>
<thead>
<tr>
<th>Grade Type</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lab Average</td>
<td>40%</td>
</tr>
<tr>
<td>2 In class team projects</td>
<td>20%</td>
</tr>
<tr>
<td>2 one-hour exams</td>
<td>20%</td>
</tr>
</tbody>
</table>
Final research project 20%

Two one-hour exams will be given. The exams will not be multiple-choice, but in essay/work-out style. These exams will cover reading, lecture material and projects. The final project will be assigned 3 weeks before end of the course and is due on the last day of lecture.

<table>
<thead>
<tr>
<th>Total Numerical Grade</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>90 - 100</td>
<td>A</td>
</tr>
<tr>
<td>80 - 89</td>
<td>B</td>
</tr>
<tr>
<td>70 - 79</td>
<td>C</td>
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<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
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Cell Phones: Please silence all cell phones prior to class. Texting during class is inappropriate and will not be tolerated.

Electronic Communication Policy: The University of Texas at Arlington has adopted the University “MavMail” address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at [http://www.uta.edu/oit/email/](http://www.uta.edu/oit/email/). There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

Examination Needs: You must bring the following to each examination:
- Scientific Calculator (You may not use a graphing calculator or a calculator capable of storing alphanumeric/textual material.)
- No. 2 pencils with eraser
- UTA Student ID Card or other valid Government-issued photo ID
- **Students are not allowed to have access to cell phones or digital pagers during any exam.**

Course Goals: Upon completing the course, the student should
- understand fundamental chemical concepts
- be able to understand and apply the scientific method
- discuss and present fundamental qualitative observations
- understand basic acquisition and manipulation of quantitative data.

SOAR Cost Share Tutoring: SOAR (Students Obtaining Academic Readiness) is located in 132 Hammond Hall and offers free academic support for qualifying students and low-cost services for all students, including Cost Share Tutoring.

Strategies for Succeeding in Chemistry 1345:
1. Attend every lecture. In class projects and discussion will be the foundation for your success.
2. Prior to class, read the assigned paragraphs in the book.
3. Review your lecture/project notes after each class. Correct obvious errors and note topics which require further study or clarification.
4. Form a discussion group. Discussing the concepts we cover in class with others greatly helps with your understanding. Be able to communicate with each other on short notice, not just before class.

Grade Replacement Policy and Taking the Course Pass/Fail:
Students enrolling in this course with the intention of replacing a previous grade earned in the same course must declare their intention to do so with the registrar no later than Census Date. Please consult the Undergraduate Catalog for university policy regarding grade replacement.

If P or F is a grade option in this class and you intend to take this class for a pass/fail grade instead of a letter grade, you must inform the instructor, through the necessary paperwork, of your intentions before the census date (June 20th). Please consult the Undergraduate Catalog for the university policy regarding taking a course pass/fail.

Academic Dishonesty: All students are expected to pursue their scholastic careers with honesty and integrity, and the Department of Chemistry and Biochemistry will not tolerate academic dishonesty in any form. “Scholastic dishonesty includes but is not limited to: cheating, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” (Regents’ Rules and Regulations, Part One, Chapter VI, Section 3, subsection 3.2, Subdivision 3.22)

Examples of academic dishonesty include:
- exchanging answers or information during a test or quiz
- looking at another student’s paper during a test or quiz
• bringing notes in any form into the test or quiz, including written notes (crib sheets), digitally stored information (including formulas, constants, alpha-numeric material or text), or notes stored in any other medium
• looking at a book or other unauthorized source during the quiz or test

During tests or quizzes, students are not allowed to use any hand-held calculators or computers which possess the capability of storing alpha-numeric or textual material. If the instructor allows the use of calculators on a particular test, then students may only use scientific calculators which are non-programmable. In addition, students are not allowed to have access to cell phones or digital pagers during any test or quiz. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.

Americans with Disabilities Act:
The University of Texas at Arlington is committed to the spirit and letter of federal equal opportunity legislation. The Americans with Disabilities Act (ADA) provides those with disabilities with the same opportunities as all citizens. If you require an accommodation based on disability, I would be happy to meet with you in the privacy of my office, during the first week of the semester, to make sure you are appropriately accommodated.

Bomb Threats: In the event of a bomb threat to a specific facility, University Police will evaluate the threat. If required, exams may be moved to an alternate location, but exams will not be postponed. UT-Arlington will prosecute those phoning in bomb threats to the fullest extent of the law.

Signature Assignment/Lab report: Separation and quantification of a mixture. Students will work in Lab groups with 2 students. The Lab will be Inquiry based. The students will be introduced into the separation of mixtures according to their physical properties in the lecture portion of the course and will be asked to design a laboratory procedure. The instructor will review the procedure, discuss changes with the students and finally approve an appropriate procedure. Students will perform the lab according to the procedure they designed and will mass the separated substances. Grades will be assigned according to: Completeness and quality of the written lab procedure, Quality of the lab report and precision in their final masses of the different substances.

Sample instructions:

Chemistry lab design 1 9/21/2012

Name:___________________________________________________________

Objective:

Design a lab procedure to separate and quantify a mixture of the following substances:

- iron filings,
- Table salt,
sawdust
sand

**using only these tools:**
bunsen burner,
rubber tubing,
ever evaporating dish,
beakers,
filter paper,
funnel,
watch glass,
scoops,
forceps,
glass stirring rod,
distilled water,
wash bottle,
magnet,
tape,
scale,
wire gauze,
ring stand,
zip lock bags.

Write a procedure for this lab. Discuss the lab procedure with your instructor. You will perform the lab according to your written lab procedure and will write a lab report. Your grade will depend on the quality of the written procedure, the written lab report and the precision of the quantification of your substances.