Conceptual Chemistry
CHE 101-XX

Name:
Email:
Phone:
Office:
Office Hours:
Department: Chemistry and Biochemistry
Class meeting time and place:

Course Description:
CHE 101 is an overview of the field of chemistry and its impact on science, technology, society and the environment. This conceptual approach involves a minimum of mathematics and investigates the chemistry found in the world around us, especially environmental issues. This course utilizes an integrated lecture/lab format and does not count toward a major or minor in chemistry. Instruction will consist of two hours of lecture and two hours of lab per week. Lab fee required.

Program Learning Outcomes:

This is a general education core curriculum course and no specific program learning outcomes for this major are addressed in this course.

General Education Core Curriculum Objectives/Outcomes:

1. Critical Thinking: to include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information.
2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral, and visual communication.
3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.
4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

Student Learning Outcomes:

1. Students will correctly interpret the chemical behavior of substances using the body of knowledge of chemistry as a foundation. ***(critical thinking skills)***
2. Student will communicate effectively in written reports and oral presentations. ***(communication skills)***
3. Students will correctly assemble laboratory equipment, collect appropriate data, and analyze and interpret the results. ***(empirical and quantitative skills)***
4. Students will cooperate with each other in achieving successful completion of group projects. ***(teamwork)***

Text and Materials:

The Extraordinary Chemistry of Ordinary Things, 4th ed., by Carl H Snyder, John Wiley & Sons, Inc,. 2011.
plus additional material / supplements distributed in class.

Course Requirements:

1. Semester exams. There will be four semester exams during the semester, and a comprehensive Final cumulative with emphasis on the material covered since the last exam. These exams will consist of discussion questions, and/or multiple choice, true/false, fill-in-blanks or essay type questions. Multiple choice questions will have no partial credit. In addition, homework problems will be assigned. Continuous quizzes will be given in class. These quizzes will test your understanding of material covered in class.
2. Oral Presentations: Both oral and written Communication Skills will be assessed. Students will write formal library reports, lab reports, and solutions of problems. Students will be required to make at least one oral presentation in the semester.

Course Calendar:
(Brief version – more detailed version in subsequent pages)

Week	Class Topic
1	What is Chemistry? Classification of Matter and Microscopic and Macroscopic Viewpoints
2	Measurement in the Metric System and Scientific Method
3	Elements, Atoms, Ions, and the Periodic Table
4	Bonding in Chemical Compounds and Geometry of Molecules
5	Aqueous Solutions
6	Acids and Bases
7	Earth's Atmosphere
8	Properties of Gases
9	Energy – Fossil Fuels
10	Energy – Nuclear Fission

11	Natural Polymers – Nucleic Acids, Proteins, and Sugars
12	Medicines and Drugs
13	Semester Capstone Activity – Chromatography Simulation
14	Semester Capstone Activity – Paper Chromatography Experimental Work.
15	Semester Capstone Activity – Paper Chromatography Reports

Grading Policy:

The grade is a percent of the total points composed of laboratory activities and five exams. Percentages may vary by instructor. The grade composition is as follows:

Laboratory activities, homework, quizzes, and oral presentation(s)	1/3 of course grade	33.33 % of total grade
5 Exams (4 semester exams & one Comprehensive Final Exam)	2/3 of course grade	66.67 % of total grade
TOTAL		100 %

Attendance Policy

Attendance of class is mandatory as per SFASU policy.

Academic Integrity (*A-9.1*)

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades *Semester Grades Policy (A-54)*

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Classroom Behavior Policy

To ensure a classroom environment conducive to learning, any forms of classroom disruptions will not be tolerated (examples but not limited to – talking, use of cell phones/beepers, sleeping, reading other material, eating/drinking). Students who violate these rules will be asked to leave. Repeat offenders will be subject to disciplinary action in accordance with University policies as described in the Code of Student Conduct.

Preparation for TEKS

If you are taking this course in preparation for the TEKS (to become a teacher) you need to contact **Dr. John Moore** in Room 117, Math Building.

CHE 101 Conceptual Chemistry – Topical Outline

Week	Class Topic	Core Obj.	Activity
1	What is Chemistry? Classification of Matter and Microscopic and Macroscopic Viewpoints	1,2,4	Hands on activity on the chemical and physical behavior of a burning candle. (Exercise based on lectures given by Michael Faraday in the 1850's. Historical perspective on chemistry will be noted.) **(obj. 1)** *Instructor* will demonstrate how to observe carefully and how to interpret these observations. **(obj. 4)** *Instructor* will present a lecture and provide handouts to students instructing them how to effectively work in groups. After instruction, *students* will carry out task in small groups. **(obj.2)** *Instructor* and *students* will engage in a dialogue during which students will communicate their observations and interpretations to entire class
2	Measurement in the Metric System and Scientific Method	3, 4	**(obj. 3)** *Instructor* will compare conventional English system and the metric system in a lecture. *Instructor* will demonstrate how to

			carry out careful measurements and how to assess accuracy of measures. In a hands-on activity in which *students* will make measurements on several objects or quantities using the metric system, make conversions between English and metric, and report results in appropriate units and level of accuracy. **(obj. 4)** *Students* will make measurements in small groups
3	Elements, Atoms, Ions, and the Periodic Table	1,2	**(obj.1)** *Instructor* will introduce the NASA JPL periodic table simulator to students and demonstrate its use. [The simulator represents the logical process that Mendeleev used in creating the periodic table. This exercise also provides a direct link to the history of chemistry.] *Students* will demonstrate their understanding of the design principles underlying the periodic table by working individually on the NASA JPL periodic table simulator. **(obj. 2)** *Instructor* will present format and expectations for a

			written report using a lecture and templates. *Students* will write brief individual reports of their work on the simulator
4	Bonding in Chemical Compounds and Geometry of Molecules	1,2,4	**(obj. 1)** *Instructor* will demonstrate how to access and use of the PHET (Univ. of Colorado) on-line molecular structure building software simulators as an introduction to the project and then show how to identify chemical elements and identity of compounds in sample puzzles. *Students* will work on the PHET simulators and then solve a set of puzzles. **(obj. 4)** *Students* will solve the puzzles in small teams. Each team will have its own set of puzzles. **(obj. 2)** *Students* will write a brief team report reporting their solutions to the puzzles.
5	Aqueous Solutions	1, 2	**(obj. 1)** *Instructor* will demonstrate how to access and use of the PHET (Univ. of Colorado) on-line simulations on strong / weak / non-electrolytes. As individuals, students will use the PHET

			simulations to study the properties of strong and weak electrolytes and nonelectrolytes. **(obj. 2)** *Students*, as individuals, will write a brief report on their observations and conclusions from the simulations.
6	Acids and Bases	1,3,4	**(obj. 1)** *Instructor* will lecture on the concept of pH, the difference in pH values from comparable strong and weak acids or bases, and the measurement of pH using indicators. *Students* will study the pH of aqueous solutions of acid and base solutions using an anthocyanin, a natural pigment found in red cabbage. The anthocyanin will take a different color depending on the pH of solution. **(obj. 3)** *Instructor* will demonstrate experimental measurement of pH using indicators using set of acids and bases and indicators. *Students* will evaluate the strength of several acid and base solutions using the natural pigment and more accurate values from commercial pH

			strips. **(obj. 4)** *Students* will perform this exercise in small teams
7	Earth's Atmosphere	1 - 4	**(obj. 1)** *Instructor* will lecture on the composition and the properties of the atmosphere. **(obj. 3)** *Instructor* will demonstrate the activity in which students will determine the percentage of the oxygen in the air. Instructor will also demonstrate how numerical data is to be reduced to conclusions. *Students* will subsequently carry out the experiment, collect, and analyze data. Data will be collected for analysis by class as a whole. **(obj. 4)** *Students* will carry out the experiment in small teams. **(obj. 2).** *Students* will report their results orally at completion of team tasks.
8	Properties of Gases	1-4	**(obj. 1)** *Instructor* will lecture on the ideal gas law and the relation between the quantities of starting materials and amount of gas collected.

			(obj. 3) *Instructor* will demonstrate how to react baking soda and vinegar to produce carbon dioxide and collect the gas in balloons without loss. *Instructor* will show how to use the data collected to demonstrate relationships among quantities. *Students* will subsequently carry out the experimental procedure and data reduction analysis. **(obj. 4)** *Students* will perform the experiments and analyze data in small teams. **(obj. 2)** *Students* will write team reports describing the experiments conducted and results obtained.
9	Energy – Fossil Fuels	1 - 4	**(obj. 1)** *Instructor* will discuss the chemical principles underlying the change of pH of aqueous solutions upon dissolving carbon dioxide. **(obj. 3)** *Instructor* will demonstrate the experimental procedure simulating the dissolution of carbon dioxide in water to form acid rain and in the acidification of lakes and oceans and for

			measuring and interpreting changes in pH. *Students* will then carry out the experiment demonstrated by the instructor. **(obj. 4)** *Students* will perform the experiments in small teams. **(obj. 2)** *Students* will report their results orally to the entire class for further discussion of their results.
10	Energy – Nuclear Fission	1 - 4	**(obj. 1)** *Instructor* will lecture on the concept of half-life and its relevance to nuclear processes and applications. **(obj. 3)** *Instructor* will demonstrate the simulation and explain how it embodies the concept of half-life. [The simulation represents the half-life of a radioactive element using M&M's candies.] *Instructor* will show how data is to be recorded carefully, graphed, and interpreted. *Students* will then conduct the simulation exercise. **(obj. 2)** *Students* will write small group reports of their results. A composite report will be prepared as a class

			sharing data together. **(obj. 4)** *Students* will perform the simulation in small groups.
11	Natural Polymers – Nucleic Acids, Proteins, and Sugars	1 - 4	**(obj. 1)** *Instructor* will lecture on the principles underlying mass spectrometry of biologically interesting molecules. **(obj. 3)** *Instructor* will demonstrate how mass spectrometry can be used to determine molecular structures using example systems. *Instructor* will demonstrate how the selected simulation system models the process and how it can be used to solve sample problems corresponding to interpreting mass spectra of biopolymers. *Students* will demonstrate mastery of the concepts by carrying out a simulation in which these principles are applied by solving puzzles in the simulation system. **(obj. 4)** *Students* will solve puzzles in small teams. Each team will have a different set of puzzles. **(obj. 2)** Students will submit written team reports in which they

			present their solutions to the puzzles and the process by which the solutions were obtained.
12	Medicines and Drugs	1 - 4	**(obj. 1)** *Instructor* will lecture on the role of iodine in the biochemistry of the human body and how the presence and amount of this trace nutrient can be determined. **(obj. 3)** *Instructor* will demonstrate tests for iodide in different types of table salts under different experimental conditions. *Students* will use this information to carry out tests on a set of samples. **(obj. 4)** *Students* will perform experiments in small teams. **(obj. 2)** *Students* will present oral team reports to entire class for group discussion and analysis.
13	Semester Capstone Activity – Chromatography Simulation	1,2,4	**(obj. 1)** *Instructor* will lecture on the principles of column chromatography. **(obj. 3)** *Instructor* will lecture on the simulation and demonstrate how it embodies the principles of column chromatography by carrying out sample simulations. *Students*

			will apply these principles by carrying out simulations and interpreting separation efficiency based on rules used in the simulation. **(obj. 4)** *Students* will perform simulations of column chromatography in small teams. Each team will be given different rules to run using a spreadsheet or random number generator. **(obj. 2)** *Students* will communicate their results to entire class in oral team reports.
14	Semester Capstone Activity – Paper Chromatography Experimental Work.	1,3,4	**(obj. 1)** *Instructor* will lecture on the principles of solubility of solutes in solvents based on their chemical and physical properties. **(obj. 3)** *Instructor* will lecture on the paper chromatography, the principles behind it, and its use in separating chemical compounds. *Instructor* will demonstrate proper experimental technique with a sample system. *Students* will carry out the experiments on the materials assigned them after instruction. They will interpret their results based on the

			chemical and physical properties of the solutes and solvents. **(obj. 4)** *Students* will work in small teams. *Students* will carry out the paper chromatography separations on different materials for each group.
15	Semester Capstone Activity – Paper Chromatography Reports	2	**(obj 2)** *Students* will submit a written team report of their work and present their results to the class orally.