

Eastern Oregon University
Course Syllabus

Number of Course: CHEM 206

Name of Course: General Chemistry

Catalog Description:

Principles of chemistry for chemistry/biochemistry majors and related fields. Topics covered include chemical equilibria of inorganic systems, acids and bases, solubility, thermodynamics and electrochemistry.

Credit Hours: 5

Required Texts or Suggested Materials:

Are available at: <http://eou.bncollege.com/>

Prerequisites: CHEM 205 or equivalent.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Develop strong problem-solving skills and use mathematical abilities to solve problems and interpret quantitative information as it pertains to the application of chemical equilibrium to various reactions.
2. Apply the scientific method in the laboratory; learn how to investigate an analytical problem and gain knowledge of fundamental methods of analysis (qualitative and quantitative) for typical water monitoring parameters; draw accurate conclusions about the chemical composition of unknown samples as it pertains to water monitoring projects.
3. Communicate the results of these analyses to peers and other interested parties with written reports and oral presentations.
4. Have an appreciation for the complexity of the problems faced by analytical chemists particularly in the context of environmental monitoring and understand potential social, political, and economic implications.

Course Requirements:

The class meets four times per week for a fifty minutes lecture, and once a week for a three-hour laboratory period. Attendance to lectures is strongly recommended. Attendance to laboratory and associate field trip is mandatory. The lab will be dedicated to a water monitoring service learning project at Ladd Marsh. There will be no "make-up" class activities, quizzes or examinations. The homework will be assigned on a weekly base. A calculator is required for examinations. NOTE: The final exam will be the ACS standardized exam for which only non-programmable calculators are allowed.

Grading Policies:

Grades will be assigned according to the following

Two Hour Examinations	30%	90%-100% = A
Final Examination	20%	80%-89% = B
Quizzes	10%	70%-79% = C
Homework and class activities	10%	60%-69% = D

Laboratory

30%

Less than 60% = F

Total 100%

+/- grades may also be assigned according to class performance.

Means of Assessment:

Learning outcomes #1: Students' ability to use mathematical skills to solve problems and interpret quantitative information as it pertains to the application of chemical equilibrium to various reactions will be assessed by a variety of tools including examinations, quizzes, and homework assignments. Two 1-hour examinations and a final examination will be required. All examinations will be comprehensive and will consist of multiple choice, short answer ("fill in the blank"), long answer ("story problem"), and brief essay questions. The final examination will be the American Chemical Society's Standardized General Chemistry Examination. There will also be daily class activities, unannounced quizzes in lecture and weekly homework problem sets. (CONTENT KNOWLEDGE, CRITICAL THINKING)

Learning outcomes #2: Students' ability to apply the scientific method in the laboratory; learn how to investigate an analytical problem and gain knowledge of fundamental methods of analysis (qualitative and quantitative) for typical water monitoring parameters; draw accurate conclusions about the chemical composition of unknown samples as it pertains to water monitoring projects will be assessed through a pre-test/post-test set of questions and the results (accuracy and precision) of analyses characterizing the chemical composition of a given number of unknown samples, including water samples from Ladd Marsh (CONTENT KNOWLEDGE, CRITICAL THINKING).

Learning outcomes # 3: Students' ability to communicate the results of analyses to peers and other interested parties with written reports and oral presentations will be assessed based on the quality of written laboratory reports (as described by the assessment rubric) and the final oral presentation summarizing the results of the water monitoring project. (COMMUNICATION).

Learning outcomes # 4: Students' ability to develop an appreciation for the complexity of the problems faced by analytical chemists particularly in the context of environmental monitoring and understand potential social, political, and economic implications will be assessed with a reflection paper on the service learning experience (FURTHER LEARNING AND CIVIC ENGAGEMENT)

Brief Outline of Course:

At the completion of this course students will have a knowledge of and will be able to:

-Understand the dynamic nature of chemical equilibrium; be able to write the equilibrium constant for a given reaction; state Le Chatelier's principle and use it to predict changes in a chemical equilibrium with changes in concentrations, pressure, temperature and volume; be able to perform calculations involving chemical equilibrium.

-Understand the Brønsted-Lowry concept and the Lewis concept of acids and bases; identify the conjugate acid-base pairs; relate the strength of weak acids and bases to their chemical structure; define and use the pH scale; be able to perform calculations pertaining to strong and weak acids and bases, polyprotic acids, acid/base ions, and acid/bases in presence of common ions; understand how a buffer solution works, be able to perform calculations involving buffer solutions and be able to prepare a buffer; understand how acid/base indicators work and what

indicator to choose for a specific titration; understand fully the process of a titration and be able to compute the species present in solution at any time in the titration.

-Define the solubility product constant and the molar solubility; compute the molar solubility of sparingly soluble compounds in pure water and in presence of common ions; know how to use the product quotient, Q_{ip} to determine the direction of a precipitation reaction and determine whether precipitation is complete using the K_{sp} value; understand why and how pH affect some precipitation reactions; define a complex ion and a ligand and calculate equilibrium concentrations when complex ions are present.

-Define a spontaneous process; define entropy and compute entropic changes for simple chemical systems; know the Second Law and the Third Law of Thermodynamics; know the standard states used to define common thermodynamic properties; define Gibbs free energy and compute Gibbs free energy changes for simple chemical systems; understand the importance of Gibbs free energy in predicting chemical reactions; understand the relationship between the Gibbs free energy, the temperature, and the equilibrium constant.

-Define anode and cathode and balance red-ox equations in acidic and basic solutions; know different types of electrochemical cells; compute cell potentials for different electrochemical systems under different conditions; understand the relationship between cell potential, Gibbs free energy, temperature, and the equilibrium constant; be familiar with the operation of different types of batteries, and know how corrosion works.

- Participate in a Service Learning project involving water quality monitoring and perform associated analyses.

General Education Category and Outcomes:

1. Content Knowledge:

-Students consistently and accurately use key concepts, themes, and vocabulary of physical sciences (Learning Outcomes #1&2, above, and Assessment #1&2)

-Consistently and accurately identifies and describes issues and ideas within the physical sciences. (Learning Outcomes #2&3, above, and Assessments #2&3)

2. Critical Thinking

Clearly defines the problem and outlines necessary objectives in an efficient manner. Understands larger context of problem. (Learning Outcomes #1&2, above, and Assessments #1-3)

-Consistently uses new procedures and tools successfully, and can describe rationale for them. (Learning Outcomes #2, above, and Assessment #2)

3. Communication

-Read, write, and communicate taking into consideration purpose, audience, and occasion (Learning Outcomes #3, above, and Assessments #3&4)

4. Further Learning and Civic Engagement

-Engage in further learning and be of service to society (Learning Outcomes #4, above, and Assessments # 4)

Writing Center Statements:

For on-campus courses

The Writing Center provides a place — physical or virtual — where every EOU writer can find an interested, responsive reader. Writing tutorials are free of charge for EOU's undergraduate and graduate students who are writing for any course at any level, or who are writing resumes, job

letters, graduate applications, and more. Go to eou.mywconline.com to schedule an appointment in the Writing Center (Loso Hall 234).

For online or on-site courses

The Writing Center provides a place — physical or virtual — where every EOU writer can find an interested, responsive reader. Writing tutorials are free of charge for EOU students writing for any undergraduate course. Go to [EOU's eTutoring page](#) to submit a paper to a writing tutor.

For graduate courses

The Writing Center provides a place — physical or virtual — where every EOU writer can find an interested, responsive reader. Writing tutorials are free of charge for EOU students writing for any graduate course. Go to [EOU's eTutoring page](#) to submit a paper to a writing tutor. Click on [Graduate Students How To](#) for information about tagging your submission.

Classroom Decorum:

Academic Misconduct Policy:

Eastern Oregon University places a high value upon the integrity of its student scholars. Any student found responsible for an act of academic misconduct (including but not limited to cheating, unauthorized collaboration, fabrication, facilitation, plagiarism or tampering) may be subject to having his or her grade reduced in the course in question, being placed on probation or suspended from the University, or a combination of these. (Please see the Student Handbook online at <http://www.eou.edu/sse/student-handbook/>).

Accommodations/Students with Disabilities policy:

Any student who feels he or she may need an accommodation for any type of disability, must contact the Disability Services Office in Loso Hall, Room 234. Phone: 541-962-3081.

Disclaimer:

This standard syllabus provides only general information on the course. For those enrolled in the course a detailed syllabus will be provided by the Instructor at the beginning of the term. Please keep in mind that not all courses are offered every year. Consult Webster for scheduling information.

Date: 2018