Course Description

Provides an overview of key science-related topics that are fundamental to the fields of environmental management and occupational safety and health. Examines the fundamental concepts of classical physics and chemistry with an emphasis on the application of force and movement and key inorganic and organic chemistry concepts commonly encountered by the environmental and safety professional.

Course Textbook


Course Learning Outcomes

Upon completion of this course, students should be able to:

1. Apply key concepts of classical physics including work, energy, force, velocity, and acceleration to occupational safety and health.
2. Describe elements, their properties, and how they combine to form ionic and molecular compounds.
3. Explain states of matter.
4. Explain ionic/covalent bonding, polar/non-polar bonding, and intermolecular forces.
5. Discuss chemical reactions and volumetric relationships.
6. Distinguish between acids and bases and between oxidation and reduction reactions.
7. Discuss organic and inorganic chemistry.
8. Distinguish between classes of hydrocarbons and their respective properties.

Credits

Upon completion of this course, the students will earn three (3) hours of college credit.

Course Structure

1. **Study Guide**: Each unit contains a Study Guide that provides students with the learning outcomes, unit lesson, required reading assignments, and supplemental resources.
2. **Learning Outcomes**: Each unit contains Learning Outcomes that specify the measurable skills and knowledge students should gain upon completion of the unit.
3. **Unit Lesson**: Each unit contains a Unit Lesson, which discusses lesson material.
4. **Reading Assignments**: Each unit contains Reading Assignments from one or more chapters from the textbook.
5. **Suggested Reading**: Suggested Readings are listed in each unit’s study guide. Students are encouraged to read the resources listed if the opportunity arises, but they will not be tested on their knowledge of the Suggested Readings.
6. **Unit Assessments**: This course contains eight Unit Assessments, one to be completed at the end of each unit. Assessments are composed of multiple-choice questions and written-response questions.
7. **Unit Assignments**: Students are required to submit for grading a Unit Assignment in Unit IV. Specific information and instructions regarding this assignment are provided below. A grading rubric is included with this assignment. Specific information about accessing this rubric is provided below.
8. **Ask the Professor**: This communication forum provides you with an opportunity to ask your professor general or course content related questions.

9. **Student Break Room**: This communication forum allows for casual conversation with your classmates.

---

### CSU Online Library

The CSU Online Library is available to support your courses and programs. The online library includes databases, journals, e-books, and research guides. These resources are always accessible and can be reached through the library webpage. To access the library, log into the myCSU Student Portal, and click on “CSU Online Library.” You can also access the CSU Online Library from the “My Library” button on the course menu for each course in Blackboard.

The CSU Online Library offers several reference services. E-mail (library@columbiasouthern.edu) and telephone (1.877.268.8046) assistance is available Monday – Thursday from 8 am to 5 pm and Friday from 8 am to 3 pm. The library’s chat reference service, *Ask a Librarian*, is available 24/7; look for the chat box on the online library page.

Librarians can help you develop your research plan or assist you in finding relevant, appropriate, and timely information. Reference requests can include customized keyword search strategies, links to articles, database help, and other services.

### LibGuides

Think of a LibGuide (a Library Guide) as a mini-website to help you with your assignments. It has relevant information such as databases, ebooks, and websites specific to your courses. If you have any questions, please reach out to your friendly library staff.

Click [here](#) for the LibGuide for this course.

---

### Unit Assignment

#### Unit IV Case Study

**Chemical Compatibility**

You are the laboratory director at a commercial analytical laboratory. There was recently an incident at your laboratory involving the storage of incompatible chemicals. One of the corrective actions recommended to prevent the reoccurrence of this incident involved the segregation and storage of incompatible chemicals.

Your laboratory uses the following chemicals:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Chemical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>Potassium Chlorate</td>
</tr>
<tr>
<td>Acetone</td>
<td>Potassium Cyanide</td>
</tr>
<tr>
<td>Ammonia (aqueous)</td>
<td>Sodium Azide</td>
</tr>
<tr>
<td>Aniline</td>
<td>Sodium Hydroxide</td>
</tr>
<tr>
<td>Hydrochloric Acid</td>
<td>Sodium Peroxide</td>
</tr>
<tr>
<td>Hydrogen Peroxide</td>
<td>Sulfuric Acid</td>
</tr>
<tr>
<td>Nitric Acid</td>
<td>Toluene</td>
</tr>
</tbody>
</table>

Using at least one source from the CSU Online Library and one source from the Internet, write a two- to three-page paper that provides appropriate information to answer the following questions:

1. Outline your plan for the safe segregation and storage of the laboratory chemicals present at your commercial analytical laboratory. What chemical information or properties should be used to determine chemical compatibility? How should the chemicals be stored?

2. Describe the requirements of the new global harmonization system (GHS). What information on the chemical safety data sheets (SDS) can be used to help determine chemical compatibility?
Provide a list or table grouping the chemicals based on their compatibility. Select two sets of incompatible chemicals (two chemicals for each set). Discuss why the chemicals you selected are incompatible and the potential hazards posed by a mixture of these chemicals.

Information about accessing the Blackboard Grading Rubric for this assignment is provided below.

**APA Guidelines**

The application of the APA writing style shall be practical, functional, and appropriate to each academic level, with the primary purpose being the documentation (citation) of sources. CSU requires that students use APA style for certain papers and projects. Students should always carefully read and follow assignment directions and review the associated grading rubric when available. Students can find CSU's Citation Guide by clicking [here](#). This document includes examples and sample papers and provides information on how to contact the CSU Success Center.

**Blackboard Grading Rubrics**

**Assignment Rubrics**

One or more assignments in this course utilizes a Blackboard Grading Rubric. A rubric is a tool that lists evaluation criteria and can help you organize your efforts to meet the requirements of an assignment. Your professor will use the Blackboard Grading Rubric to assign points and provide feedback for the assignment.

You are encouraged to view the assignment rubric before submitting your work. This will allow you to review the evaluation criteria as you prepare your assignments. You may access the rubric in “My Grades” through the “Tools” button in your course menu. Click the “View Rubric” link to see the evaluation criteria for the assignment. Upon receiving your assignment grade, you may view your grade breakdown and feedback in the rubric.

**CSU Grading Rubrics for Papers/Projects and Assessments**

The Learning Resource area of the myCSU Student Portal provides the rubrics, and information on how to use them, for written response questions in Unit Assessments, and Research Papers/Projects.

The course writing assignments will be graded based on the CSU Grading Rubric for all types of writing assignments, *unless otherwise specified within assignment instructions*. In addition, all papers will be submitted for electronic evaluation to rule out plagiarism. Course projects will contain project-specific grading criteria defined in the project directions.

To view the rubrics, click the Student Resources link in the Course Menu or access them through the CSU Grading Rubric link found in the Learning Resources area of the myCSU Student Portal.

**Communication Forums**

These are non-graded discussion forums that allow you to communicate with your professor and other students. Participation in these discussion forums is encouraged, but not required. You can access these forums with the buttons in the Course Menu. Instructions for subscribing/unsubscribing to these forums are provided below.

*Once you have completed Unit VIII, you MUST unsubscribe from the forum; otherwise, you will continue to receive e-mail updates from the forum. You will not be able to unsubscribe after your course end date.*

[Click here for instructions on how to subscribe/unsubscribe and post to the Communication Forums.](#)

**Ask the Professor**

This communication forum provides you with an opportunity to ask your professor general or course content questions. Questions may focus on Blackboard locations of online course components, textbook or course content elaboration, additional guidance on assessment requirements, or general advice from other students.

Questions that are specific in nature, such as inquiries regarding assessment/assignment grades or personal accommodation requests, are NOT to be posted on this forum. If you have questions, comments, or concerns of a non-
public nature, please feel free to email your professor. Responses to your post will be addressed or emailed by the professor within 48 hours.

Before posting, please ensure that you have read all relevant course documentation, including the syllabus, assessment/assignment instructions, faculty feedback, and other important information.

**Student Break Room**

This communication forum allows for casual conversation with your classmates. Communication on this forum should always maintain a standard of appropriateness and respect for your fellow classmates. This forum should NOT be used to share assessment answers.

**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments (8 @ 11%)</td>
<td>= 88%</td>
</tr>
<tr>
<td>Unit IV Case Study</td>
<td>= 12%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>= 100%</td>
</tr>
</tbody>
</table>

**Course Schedule/Checklist (PLEASE PRINT)**

The following pages contain a printable Course Schedule to assist you through this course. By following this schedule, you will be assured that you will complete the course within the time allotted.
By following this schedule, you will be assured that you will complete the course within the time allotted. Please keep this schedule for reference as you progress through your course.

<table>
<thead>
<tr>
<th>Unit I</th>
<th>The Chemical View of Matter/Atoms and the Periodic Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review:</strong></td>
<td>Unit Study Guide</td>
</tr>
<tr>
<td><strong>Read:</strong></td>
<td>Chapter 1: The Chemical View of Matter</td>
</tr>
<tr>
<td></td>
<td>Chapter 2: Atoms and the Periodic Table</td>
</tr>
<tr>
<td></td>
<td><strong>Suggested Reading:</strong> See Study Guide</td>
</tr>
<tr>
<td><strong>Submit:</strong></td>
<td>Assessment</td>
</tr>
<tr>
<td><strong>Notes/Goals:</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit II</th>
<th>Chemical Bonding and States of Matter/Chemical Reactivity: Chemicals in Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review:</strong></td>
<td>Unit Study Guide</td>
</tr>
<tr>
<td><strong>Read:</strong></td>
<td>Chapter 3: Chemical Bonding and States of Matter</td>
</tr>
<tr>
<td></td>
<td>Chapter 4: Chemical Reactivity: Chemicals in Action</td>
</tr>
<tr>
<td></td>
<td><strong>Suggested Reading:</strong> See Study Guide</td>
</tr>
<tr>
<td><strong>Submit:</strong></td>
<td>Assessment</td>
</tr>
<tr>
<td><strong>Notes/Goals:</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit III</th>
<th>Acid-Base Reactions/Oxidation-Reduction Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review:</strong></td>
<td>Unit Study Guide</td>
</tr>
<tr>
<td><strong>Read:</strong></td>
<td>Chapter 5: Acid-Base Reactions</td>
</tr>
<tr>
<td></td>
<td>Chapter 6: Oxidation-Reduction Reactions</td>
</tr>
<tr>
<td></td>
<td><strong>Suggested Reading:</strong> See Study Guide</td>
</tr>
<tr>
<td><strong>Submit:</strong></td>
<td>Assessment</td>
</tr>
<tr>
<td><strong>Notes/Goals:</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Unit IV: Organic Chemicals and Polymers

**Review:**
- Unit Study Guide

**Read:**
- **Chapter 7:** Organic Chemicals and Polymers
- **Suggested Reading:** See Study Guide

**Submit:**
- Assessment
- Case Study

### Unit V: The Study of Motion

**Review:**
- Unit Study Guide

**Read:**
- **Chapter 8:** Prologue: Getting Started
- **Chapter 9:** The Study of Motion
- **Suggested Reading:** See Study Guide

**Submit:**
- Assessment

### Unit VI: Newton’s Laws

**Review:**
- Unit Study Guide

**Read:**
- **Chapter 10:** Newton’s Laws
- **Suggested Reading:** See Study Guide

**Submit:**
- Assessment

### Unit VII: Energy and Conservation Laws

**Review:**
- Unit Study Guide

**Read:**
- **Chapter 11:** Energy and Conservation Laws
- **Suggested Reading:** See Study Guide

**Submit:**
- Assessment
<table>
<thead>
<tr>
<th>Unit VIII</th>
<th>Physics of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review:</strong></td>
<td>□ Unit Study Guide</td>
</tr>
<tr>
<td><strong>Read:</strong></td>
<td>□ Chapter 12: Physics of Matter</td>
</tr>
<tr>
<td></td>
<td>□ Suggested Reading: See Study Guide</td>
</tr>
<tr>
<td><strong>Submit:</strong></td>
<td>□ Assessment</td>
</tr>
</tbody>
</table>

Notes/Goals: