Course Syllabus
CHM-240 General Chemistry II

Semester and year:
Course Number:
Meeting Times and Locations:

Instructor:
Office Location:
Phone:
Office Hours:
Email Address:

COURSE DESCRIPTION:
CHM-240 General Chemistry II is the second course of a two-semester sequence of general chemistry. Topics covered include intermolecular forces, properties of solutions, chemical kinetics, equilibrium, thermodynamics, acids and bases, and electrochemistry.

CREDITS/HOURS: 3 credits/3 hours

PREREQUISITES: CHM-140 with a grade of C or better

RECOMMENDED PREREQUISITE: CHM-141

RECOMMENDED COREQUISITE: CHM-241

GENERAL ED COURSE: Yes

STUDENT LEARNING OBJECTIVES: As a result of meeting the requirements in this course, students will be able to:
1. Explain spectrophotometry, Beer-Lambert Law and solution concentrations
2. Identify the forces of interaction between molecules
3. Interpret a phase diagram
4. Explain the properties of liquids
5. Explain the classification of solids by type and crystalline structure
6. Express solution concentrations in the technical terms used in chemistry
7. Apply the concepts of colligative properties to the solution of chemistry problems
8. Explain the nature of strong and weak acids and bases
9. Interpret kinetic data and apply the principles of kinetics to reaction mechanisms
10. Explain the principles of equilibrium and calculate equilibrium constants
11. Explain the nature of acid-base buffers and calculate pH
12. Interpret the laws of thermodynamics as they apply to chemical reactions
13. Balance oxidation-reduction reactions in acid and base solutions
14. Calculate the electromotive force of voltaic cells (batteries)
15. Define and explain technical terms used in chemistry
ASSESSMENT MEASURES:
The student learning objectives will be assessed by:
1. Assigned homework problems from the text and OWL
2. Quizzes
3. Class participation
4. Unit Examinations (a minimum of 3)
5. Final Examination (comprehensive)
6. A writing component in the form of essays or short answer questions on examinations.

At the discretion of the instructor, assessment measures may be somewhat modified.


note: Text Comes with OWL and Chemistry Now. The Student Solutions Manual and Study Guide are available as separate purchases.

COURSE CONTENT:
Chapter 4: Section 4.8: Spectrophotometry; Beer-Lambert Law
Chapter 12: Intermolecular Forces and Liquids.
Chapter 13: The Chemistry of Solids.
Chapter 14: Solutions and their Behavior. *Omit* Sect. 14.5
Chapter 15: Chemical Kinetics: The Rates of Chemical Reactions.
Chapter 16: Principles of Reactivity: Chemical Equilibria
Chapter 17: The Chemistry of Acids and Bases. Sect. 17.10 qualitative aspects only
Chapter 18: Principles of Reactivity: Other Aspects of Aqueous Equilibria. *Omit* Sect. 18.6 and 18.7
Chapter 19: Entropy and Free Energy.
Chapter 23: *Nuclear Chemistry (optional).*

SUPPLEMENTARY READINGS / MATERIALS:


**OTHER REQUIREMENTS:**
1. A scientific calculator is required.
2. Students are required to use the factor-label method/dimensional analysis for problem solving.

**GRADING POLICY**

**Instructor’s Grading Policy:**
The grading policy for each section will be provided separately by the individual instructor at the first class meeting.

**General Guidelines:**
- Assigned homework problems from the text not more than 10%
- Quizzes not more than 15%
- Class participation not more than 5%
- Unit Examinations (a minimum of 3) 60 to 75%
- Final Examination (comprehensive) 10 to 25%

1. Any examination not taken will receive a grade of zero. Make-up examinations will be administered in accordance with the instructor's policy.
2. Any student caught cheating (including using unauthorized formula sheets of any kind) will receive a grade of zero on that particular examination or paper. That zero cannot be replaced by any other examination grade or extra work.
   
   **Please read The Bergen Community College Statement on academic integrity as found in the college catalog and Student Handbook.**
3. Late work is not accepted.
4. At the discretion of the instructor, the grade on the final examination may be substituted for the lowest unit exam grade for the purpose of calculating the course grade provided that the final examination grade is higher than the lowest unit examination grade.
5. Instructors may make small modifications to the grading policy.

**ATTENDANCE/LATENESS POLICY:**
All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.
OTHER POLICIES:

Electronic Devices:
The use of portable electronic devices such as pagers and cell phones is not permitted while class is in session. Please silence these devices before entering class.

Code of Student Conduct:
Students are encouraged to read, understand and follow the rules and standards of conduct as explained in the Student Handbook. The Student Handbook is available in the Office of Student Life and on the BCC website.

STUDENT AND FACULTY SUPPORT SERVICES:
Students experiencing difficulty with the arithmetic or problem solving aspects of this course should acquaint themselves with the services of the Tutoring Center and Smarthinking.

The BCC Library provides extensive support services for student research.

Faculty office hours may be a productive vehicle for assistance in understanding the course material.

Services for Students with Disabilities:
A wide variety of services are available to students with documented disabilities through the Office of Specialized Services (OSS). For further information, go to the OSS website: www.bergen.edu/oss or the office in Room L-115.

FACULTY ABSENCE PROCEDURE:
A daily listing of cancelled classes will appear in a glass case near the registration area on the first floor. Another such listing will appear in a glass case in Ender Hall. Students can consult these cases before going to class. Cancelled classes are also listed under class cancellations at bottom of the BCC website page.

Under no circumstances are notices regarding class cancellations taped to classroom doors.

If students find a class cancelled which has not been listed, they should report this to the Divisional Dean’s Office, A-325 or the Evening Office L-113.

All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, pay your bill, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You’ll find directions how to do this at <http://go.bergen.edu/email>.
## Course Outline and Calendar*

CHM-240  General Chemistry II

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic/Activity/Assignments</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to course</td>
<td>1, 15</td>
</tr>
</tbody>
</table>
|      | Chapter 4: Section 4.8 Spectrophotometry  
|      | Beer-Lambert Law, Solution Concentrations |                              |
|      | Chapter 12: Interactions between molecules  
|      | Properties of Liquids  
|      | Assigned homework problems | 2, 3, 15                    |
|      | Chapter 12: Properties of Liquids – Vapor Pressure  
|      | Enthalpy of Vaporization, Boiling Point  
|      | Assigned homework problems | 2, 4, 15                    |
|      | Chapter 13: Crystalline Solids and Unit Cells  
|      | Ionic Compounds and Lattice Energy  
|      | Assigned homework problems | 2, 5, 15                    |
| 2    | Chapter 13: Solid Materials  
|      | Phase Changes and Phase Diagrams  
|      | Assigned homework problems | 2, 3, 15                    |
|      | Chapter 14: Units of Concentration: Molarity, Molality  
|      | Mole Fraction, Mass Percentage of Solute  
|      | Assigned homework problems | 2, 4, 6, 15                  |
|      | Chapter 14: Solubility and the Solution Process  
|      | Effects of Temperature and Pressure  
|      | Henry’s Law  
|      | Assigned homework problems | 2, 4, 6, 15                  |
|      | Chapter 14: Colligative Properties:  
|      | Assigned homework problems | 2, 6, 7, 15                  |
| 3    | Chapter 15: Rates of Reactions and Orders  
|      | Rate Law and Rate constant  
|      | Assigned homework problems | 6, 9, 15                     |
| 4    | Chapter 15: Integrated Rate Laws  
|      | Graphing Kinetic Data  
|      | Half –Life  
|      | Assigned homework problems | 6, 9, 15                     |
| 5    | Chapter 15: Activation Energy  
|      | Arrhenius Equation  
|      | Assigned homework problems | 6, 9, 15                     |

*Dates for all tests will be announced by the individual instructor.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic/Activity/Assignments*</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Chapter 15: Reaction Mechanisms Catalysis Assigned homework problems</td>
<td>9, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 16: Equilibrium, Equilibrium Constant Calculations Interpreting Equilibrium Constants Calculating Equilibrium Concentrations Assigned homework problems</td>
<td>6, 10, 15</td>
</tr>
<tr>
<td>8</td>
<td>Chapter 16: LeChatelier’s Principle Disturbing a Chemical Equilibrium Changing Reaction Conditions - Effect on Equilibrium Constant Predicting Equilibrium Shifts Assigned homework problems</td>
<td>10, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 17: Arrhenius Acids and Bases Bronsted Acids and Bases – Conjugate Pairs Polyprotic Acids Water Autoionization; pH Scale Assigned homework problems</td>
<td>4, 6, 8, 10, 11, 15</td>
</tr>
<tr>
<td>9</td>
<td>Chapter 17: Relative Strengths of Acids and Bases Equilibrium (Ionization) Constants Strong Acids and Strong Bases pH of a Solution Acid–Base Properties of Salt Solutions Assigned homework problems</td>
<td>6, 8, 10, 11, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 17: Predicting the Direction of Acid Base Reactions Equilibrium Constant Calculations: Weak Acid Ionization: Equilibrium &amp; pH Weak Base Ionization: Equilibrium &amp; pH Assigned homework problems</td>
<td>6, 10, 11, 15</td>
</tr>
<tr>
<td>10</td>
<td>Chapter 17: Molecular Structure and Acid Strength Lewis Acids and Lewis Bases</td>
<td>6, 10, 11, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 18: Common-Ion Effect Buffers – Controlling pH Assigned homework problems</td>
<td>6, 10, 11, 15</td>
</tr>
</tbody>
</table>

*Dates for all tests will be announced by the individual instructor.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic/Activity/Assignments*</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Chapter 18: Solubility of Salts: Equilibrium Solubility Product Constant, Ksp Precipitation Calculations; Complex-Ion formation Assigned homework problems</td>
<td>6, 10, 11, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 19: Second Law of Thermodynamics - Entropy Entropy Measurement and Values Third Law of Thermodynamics Assigned homework problems</td>
<td>12, 15</td>
</tr>
<tr>
<td>12</td>
<td>Chapter 19: Entropy Changes and Spontaneity Gibbs Free Energy - Concept Free Energy, Spontaneity and Chemical Equilibrium Assigned homework problems</td>
<td>2, 4, 5, 6, 12, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 19: Free Energy and Temperature Assigned homework problems</td>
<td>12, 15</td>
</tr>
<tr>
<td>13</td>
<td>Chapter 20: Balancing Oxidation-Reduction Equations Redox in Acid and Basic Solutions Assigned homework problems</td>
<td>4, 6, 12, 13, 15</td>
</tr>
<tr>
<td>14</td>
<td>Chapter 20: Construction of Voltaic Cells Commercial Voltaic Cells Standard Reduction Potentials Electromotive Force (EMF) E° of Cells Oxidizing and Reducing Agents Assigned homework problems</td>
<td>4, 5, 6, 12, 13, 14, 15</td>
</tr>
<tr>
<td></td>
<td>Chapter 20: Nernst Equation Electrochemistry and Thermodynamics Electrolysis Assigned homework problems</td>
<td>3, 5, 6, 12, 13, 14, 15</td>
</tr>
<tr>
<td>15</td>
<td>Review Final Exam</td>
<td></td>
</tr>
</tbody>
</table>

*Dates for all tests will be announced by the individual instructor.

The above calendar may be modified at the discretion of the instructor to accommodate test dates.
### Bergen Community College Core Competencies

#### CHM-240 General Chemistry II

<table>
<thead>
<tr>
<th>Competency</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication</td>
<td>1–5, 7–12, 15</td>
</tr>
<tr>
<td>2. Quantitative Reasoning</td>
<td>5, 6, 8 - 14</td>
</tr>
<tr>
<td>3. Critical Thinking</td>
<td>1-15</td>
</tr>
<tr>
<td>4. Technological and Information Fluency</td>
<td>4, 5, 13, 14, 15</td>
</tr>
<tr>
<td>5. Applied Knowledge</td>
<td>1 - 15</td>
</tr>
</tbody>
</table>