Bergen Community College
School of Mathematics, Science and Technology
Physical Science Department

Course Syllabus
CHM–102  Chemistry in Context

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

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

COURSE DESCRIPTION:
CHM–102 Chemistry in Context is a student-centered approach for non-science majors to learn fundamental chemistry and its linkage to consumer issues, public policy, business and international affairs. Core topics include chemistry terminology, formulas, reactions, scientific measurements, shapes of molecules, chemical toxicity, green chemistry, consumer chemistry and energy sources. Laboratory activities emphasize fundamental concepts and measurements. Use of scientific and governmental websites, papers, poster presentations and discussion groups draw on students’ major fields of study.

CREDITS/HOURS: 3 hr lecture, 3 hr lab, 4 credits

PREREQUISITES: MAT-011 or equivalent by placement as a result of a basic skills placement test

GENERAL ED COURSE: Yes

STUDENT LEARNING OBJECTIVES: As a result of meeting the requirements in this course, students will be able to:

1. Define and explain basic technical terms used in chemistry.
2. Write names and formulas for simple compounds.
3. Identify and name important acids and bases.
4. Use scientific metric units correctly.
5. Use conversion factors to solve problems.
6. Apply basic gas laws.
7. Write a balanced chemical equation.
8. Solve simple stoichiometry problems.
9. Interpret the enthalpy changes of chemical processes.
10. Explain the wave nature and particle nature of light.
11. Explain the reasons for the changes in the ozone layer and health consequences.
12. Identify the causes of indoor and outdoor air pollution, greenhouse gasses, ground and water pollution and resulting health consequences.

13. Discuss the pro’s and con’s of efforts to solve local and global pollution, nutrition, and medicine issues and the consequences on economies, living standards and societies.
14. Explain the pro’s and con’s of Green Chemistry.
15. Access government and scientific websites, download scientific data and present data in tabular and/or chart form in a short written report or poster format.

ASSESSMENT MEASURES:
The student learning objectives will be assessed by:
1. Graded homework problems assigned from the text;
2. Written assignments, short papers and quizzes;
3. Laboratory experiments and exercises;
4. Website searches for scientific data;
5. Poster/oral presentation of scientific data on a specific topic;
6. Written examinations and an optional comprehensive final examination.


COURSE CONTENT:
Chapters 1 to 6 are core chapters.

Chapter 1: The Air We Breathe

Chapter 2: Protecting the Ozone Layer

Chapter 3: The Chemistry of Global Climate Change

Chapter 4: Energy from Combustion
Chapter 5: **Water for Life**  
Water: Molecular Structure, physical properties and hydrogen bonding.  
Solvent properties. Ions and Solutions. Covalent compounds and solutions.  
Federal water legislation and water purity. Case Studies.

Chapter 6: **Neutralizing the Threat of Acid Rain**  

The instructor will choose 2 to 3 additional chapters from the following.

Chapter 7: **The Fires of Nuclear Fission**  

Chapter 8: **Energy from Electron Transfer**  
Oxidation and reduction reactions – electron transfer, Voltaic cells and batteries. Alternative Energy.

Chapter 9: **The World of Polymers and Plastics**  

Chapter 10: **Manipulating Molecules and Designing Drugs**  

Chapter 11: **Nutrition: Food for Thought**  

Chapter 12: **Genetic Engineering and the Molecules of Life**  

**Supplementary Reading Material:**  

**Other Requirements:**  
A scientific calculator is required.
**General Grading Policy:**

A. Unit Examinations (a minimum of 3), Final Exam and Quizzes 50%
B. Papers, homework, Oral Presentations and Discussion Groups 25%
C. Laboratory Work 25%
D. Additional policies:
   1. Late work is not accepted.
   2. Any examination not taken will receive a grade of zero. Make-up examinations will be administered in accordance with the instructor's policy.
   3. Any student caught cheating (including using unauthorized formula sheets of any kind) will receive a grade of zero on that particular exam/test. That zero cannot be replaced by any other grade. Please read The Bergen Community College Statement on academic integrity as found in the college catalog and BCC Student Handbook.
   4. At the end of the semester, the grade on the final examination may be substituted for the lowest unit grade for the purpose of calculating the course grade provided that the final examination grade is higher than the lowest examination grade. At the discretion of the instructor, this policy may be somewhat modified.
   5. Exams will include a writing component in the form of a short essay or paragraph.

**Instructor’s Grading Policy:**
Will be provided separately by the individual instructor

**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.

The use of cell phone calculators is not permitted.

**Code of Student Conduct:**
Students are encouraged to read, understand and follow the rules and standards of conduct as explained in the BCC 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.

The BCC Library provides extensive support services for student research.

Faculty office hours may be a productive vehicle for assistance in understanding the course
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 go to Room L-115.

FACULTY ABSENCE PROCEDURE:

A daily listing of cancelled classes will appear in a glass case near the registration area in the corridor 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>.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic/Activity/Assignments</th>
<th>Lab</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to course; Chapter 1 Text 1-40: Matter &amp; Compounds Air components and measurement Chapter 1 problem assignment EPA website assignment</td>
<td>check-in, safety rules, explanation of poster project</td>
<td>1, 2, 4, 6, 12, 15</td>
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<tr>
<td>2</td>
<td>Chapter 2; Text 48 - 91: Atomic structure, molecules, and models, radiation, ozone, CFC’s Assignment of poster topics; in class quiz Chapter 2 problem assignment</td>
<td>Exp 1: Identification of Gases in a Breath &amp; web research</td>
<td>1, 2, 4, 6, 10, 11, 12 15</td>
</tr>
<tr>
<td>3</td>
<td>Chapter 3; Text 98 – 143: Molecule shapes, energy and bond vibration, mole concept, combustion reactions, greenhouse gases Web Assign: Short paper on Air Quality Around the Globe Chapter 3 problem assignment</td>
<td>Exp 3: Can I Spot a Trend? or Exp 6: Spectroscopy &amp; web research</td>
<td>1, 2, 4-8, 10, 12-15</td>
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<tr>
<td>4</td>
<td>Chapter 4; Text 151-190: Fuel. Chemical bonds, Energy of reactions Web Assign: Research: Contributors to world air pollution; Crude oil sources; OPEC countries; Fuel and Energy, Green Chem.</td>
<td>Exp 7: Chemical Bonds, Molecular Models Molecular Shapes &amp; web research</td>
<td>1, 2, 4, 5 7-9, 13-15</td>
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<td>Outline of oral/poster project due Chapter 4 problem assignment TEST 1</td>
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<tr>
<td>6</td>
<td>Reports: water pollution and health consequences Case report studies – in class discussion</td>
<td>Exp 11 Energy content of fuels</td>
<td>12-15</td>
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| 7    | Oral/Poster Sessions – one lecture period  
         Chapter 6; Text: 244-253; Acids, bases, Neutralization Reactions, pH  
         Chapter 6 problem assignment | Presentations | 12-15 |
| 8    | Chapter 6; Text: 253-277; Sources of  
         Chapter 6 problem assignment | Presentations | 1-5, 7-9, 15  
         Exp 12: Water and Acid Rain Conductivity of Solutions |
| 9    | Chapter 7 Text: 284 – 321 Radioactivity & Nuclear Fission (Option)  
         Chapter 7 problem assignment  
         or  
         Chapter 8 Text 327 – 356 Energy from Electron Transfer (Option)  
         Chapter 8 problems  
         Test 2 | Exp 13: Analysis of Vinegar  
         & Exp 18: pH Measurement  
         Exp 22: Redox Reactions | 1-5, 7-9 |
| 10   | Chapter 9: Text: 362 – 388  
         Plastics and Polymers  
         Research: Reuse, Recycling & Landfills  
         Chapter 9 problem assignment | Exp 24: Plastics – Density  
         & web research | 1, 2, 4, 13, 14, 15 |
| 11   | Chapter 10: Text: 397 – 408;  
         Introduction to Organic Chemistry; functional groups  
         Chapter 10 problem assignment | Exp 26: Synthesis of Aspirin  
         & web research | 1, 2, 4, 5, 12, 14, 15 |
         Research: Drug approval & problems  
         Chapter 10 problem assignment | web research | 1, 2, 4, 5, 13, 15 |
| 13   | Chapter 11: Text: 436-452; Nutrition: carbohydrates, fats and Proteins  
         Research: Sugar Substitutes, saturated and unsaturated fats  
         Draft Reports on Reuse and Recycling due to  
         Chapter 11 problem assignment | Exp 28: Measuring Sugar in Sodas and Juices  
         & web research | 1, 2, 4, 5, 7-9, 15 |
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<tr>
<td>14</td>
<td>Chapter 12: Genetic Engineering (Option) or Deeper concentration on Chapter 11 Test 3</td>
<td>Discussion: 1, 2, 4, 5, Reuse &amp; Recycling; Drug 7-9, 13, Approvals &amp; Problems; 15 Nutrition Issues</td>
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<tr>
<td>15</td>
<td>Review Final Exam</td>
<td>check-out. Student Assessment of Learning Gains (SALG) through the American Chemical Society</td>
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This calendar may be modified to accommodate tests and the course progress.
### Bergen Community College

#### Core Competencies

**CHM-102 Chemistry in Context**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Student Learning Objective</th>
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</thead>
<tbody>
<tr>
<td>1. Communication</td>
<td>13, 14</td>
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<tr>
<td>2. Quantitative Reasoning</td>
<td>4, 5, 6, 8, 15</td>
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<tr>
<td>3. Critical Thinking</td>
<td>12, 13, 14</td>
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<tr>
<td>4. Civic Responsibility</td>
<td>12, 13, 14</td>
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<tr>
<td>5. Technological and Information Fluency</td>
<td>15</td>
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<tr>
<td>6. Personal Skills</td>
<td>12, 13</td>
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<tr>
<td>7. Interpersonal Skills</td>
<td>13, 14</td>
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<tr>
<td>8. Applied Knowledge</td>
<td>1 - 15</td>
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### CHM–102 Chemistry in Context
#### Laboratory Schedule


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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Check in; Safety, Basic Laboratory Techniques; Instructor should distribute and discuss Divisional Safety rules for the Chemistry Laboratory. Explanation of Oral/Poster Sessions</td>
<td>vii</td>
</tr>
<tr>
<td>3</td>
<td>Computer Exercise: Ozone Levels Experiment 5: Visibly Delighted: How do Colored Solutions Interact with Light?</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Experiment 6: What Does a Molecule Look Like? Bonds, Molecular Models and Molecular Shapes.</td>
<td>41</td>
</tr>
<tr>
<td>5</td>
<td>Chemical Reactions: Handout Experiment 8: Chemical Moles: Baking Soda to Table Salt How Do Chemical Equations Connect Compounds?</td>
<td>55</td>
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<tr>
<td>6</td>
<td>Experiment 10: Comparison of the Energy Content of Fuels</td>
<td>63</td>
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<tr>
<td>7</td>
<td>Experiment 12: Conductivity Detector and Testing for Ions or Experiment 14: Measurement of Water Hardness</td>
<td>79, 95</td>
</tr>
<tr>
<td>8</td>
<td>Experiment 13: Analysis of Vinegar &amp; Experiment 18: Which Common Substances are Acids or Bases?</td>
<td>87, 127</td>
</tr>
<tr>
<td>9</td>
<td>Oral Reports/ Poster Session</td>
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<tr>
<td>10</td>
<td>Oral Reports/ Poster Session</td>
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<tr>
<td>11</td>
<td>Experiment 22: Can We Get Electricity from Chemical Reactions?</td>
<td>149</td>
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<tr>
<td>12</td>
<td>Computer Exercise: Acid Rain</td>
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<tr>
<td>13</td>
<td>Experiment 24: Properties of Common Plastics or Experiment 26: How is Aspirin Made?</td>
<td>165, 177</td>
</tr>
<tr>
<td>15</td>
<td>Discussion Group Check Out/Student Assessment of Learning Gains</td>
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