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

Course Syllabus  
CHM-241 General Chemistry Laboratory II

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

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

COURSE DESCRIPTION:  
CHM-241 General Chemistry Laboratory II is a continuation of CHM-141, with greater emphasis on more sophisticated experiments and equipment. It complements the material covered in CHM-240. Written lab reports are required.

COURSE CREDITS/HOURS: 1 credit/3 hours  

PREREQUISITE: CHM-140 and CHM-141 with grades of C or better  

PREREQUISITE OR CO-REQUISITE: CHM-240  

GENERAL ED COURSE: Yes  

STUDENT LEARNING OBJECTIVES: As a result of meeting the requirements in this course, students will be able to:  
1. Write laboratory reports that conform to accepted technical writing protocols.  
2. Use Excel for the representation of experimental data in graph form.  
4. Translate written and oral experimental directions into accepted laboratory practices.  
5. Use a spectrophotometer and relate concentration of chromophores with Absorption.  
6. Explain the relationship between solubility and temperature.  
7. Explain equilibrium and the factors that affect equilibrium.  
8. Explain the relationships between colligative properties, freezing point, molality and molar mass.  
9. Explain reaction kinetics and the factors that affect reaction rates.  
10. Use a pH meter and a buret as parts of laboratory protocols.  
11. Standardize solutions and perform titrations.  
12. Explain the qualitative analysis of cations.  
13. Build a voltaic cell and measure the voltage of the system.  
14. Use computer integrated technology to collect and analyze data.  
15. Apply laboratory safety rules.  
16. Demonstrate acceptable laboratory technique in the use of laboratory equipment and the handling of chemicals.  
17. Design a simple experiment based on learned techniques.
ASSESSMENT MEASURES:
The student learning objectives will be assessed by:
1. Laboratory Reports (format, data sheets, calculations, graphs, post-lab exercises)
2. Pre-Laboratory Exercises
3. Observation of acceptable laboratory techniques
4. Observation of consistent implementation of safety rules
5. Instructor-student and student-student discussion of recorded data and experimental results
6. Tests

LABORATORY MANUAL:
A spiral bound book of experiments (CHM 241 Bergen Community College) is available for purchase in the B.C.C. bookstore.

COURSE CONTENT:
Chemistry laboratory safety
Chemistry laboratory techniques
Use of sophisticated software and equipment
Experiments that emphasize the topics contained in General Chemistry II. A detailed list of experiments is found on the CHM-241 Lab Schedule (last page).
Data collection, data analyses and graphical representation of data and/or results
Use of factor label method/dimensional analysis for problem solutions.
Laboratory report writing

OTHER REQUIREMENTS:
Safety goggles or safety glasses are required and may be purchased at the B.C.C. bookstore or at a hardware store.

A scientific calculator is required.

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:
1. Laboratory Reports (prelab, data sheets, graphs, post lab and format) . . . 60 %**
2. Examinations (minimum of two and a comprehensive final) . . . . . . . 40 %**
3. Safety Violations ..........................................................minus points**

**Subject to the instructor's discretion
There will be no make-up labs or examinations except in certain special circumstances at the instructor's discretion. Even in those cases all make-up situations must be resolved within a week of the missed class. Any missed lab or examination will be assigned a grade of zero.

Students found cheating will be dealt with appropriately. Cheating includes using the data, prelabs or post labs of another student past or present. It also includes using unauthorized formula sheets of any kind during an examination.
Please read The Bergen Community College Statement on academic integrity as found in the college catalog and the Student Handbook.
DATA RECORDING AND LABORATORY REPORT FORMAT:

1. Data is to be recorded directly onto data sheets.  
   NO SCRATCH PAPER.

2. Use **blue** or **black** ink to record all data.  
   NO WHITE-OUT.  
   If a mistake is made in recording data, neatly cross out mistake and write the correct data nearby.

3. Data sheets must be signed and dated by the instructor before the end of the lab period.

4. Each person is required to perform his/her own lab work. Individual unknowns must be obtained from the instructor and evaluated. Students will be informed when there is a need to work with a partner.

5. Laboratory reports are due no later than one week after the completion of the experiment and must be submitted **at the beginning of the lab period in which it is due**. Lateness in submission may result in penalty points at the discretion of the instructor.

6. **LAB REPORT CONTENT:**  
   Follow the following order with regard to organization of lab report pages.  
   Handwritten reports are acceptable. However, graphing is to be done using Excel.  
   Staple all pages together.  
   1. Cover page: title of experiment, student name, instructor name and date  
   2. Data sheets (instructor initialed and dated) with supporting calculations.  
      Sample calculations **must** be clearly shown.  
   3. Graphs of experimental results if part of the experiment. Use Excel for graphs.  
   4. Post lab exercises and any post lab graphs. Use Excel for graphs.  
   5. Concluding/summary paragraph. In a short paragraph (approximately ten sentences) state the objectives of the experiment and explain whether the data recorded and the analyses of the data support the expected objectives. If the experimental objectives were not met explain the source of errors.

**ATTENDANCE POLICY:**  
Attendance at laboratory sessions is mandatory. Students are expected to report to lab on time, if not a few minutes early. The pre-lab presentations/directions by the instructor for the proper and **safe** performance of the experiment are critical to conducting each experiment correctly. It has been found that students who miss some or all of this presentation usually perform their experiments poorly. Keep in mind, it is the instructor's discretion as to when it is too late for a student to safely and successfully complete an experiment.

**OTHER POLICIES:**

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

**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 go to 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.

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CHM241SCOGenEd.Fa2011
# Course Outline and Calendar*

## CHM-241  General Chemistry Laboratory II

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC/ EXPERIMENT NUMBER</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check In, Course Overview</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solubility / PROP 421</td>
<td>1– 4, 6, 15, 16</td>
</tr>
<tr>
<td>2</td>
<td>Spectroscopy / TECH 488</td>
<td>1–5, 13-16</td>
</tr>
<tr>
<td>3</td>
<td>Preparation and Analysis of a Copper Compound (Week 1) / SYNT 432</td>
<td>3, 4, 15, 16</td>
</tr>
<tr>
<td>4</td>
<td>Preparation and Analysis of a Copper Compound (Week 2) / SYNT 432</td>
<td>1–5, 15, 16</td>
</tr>
<tr>
<td>5</td>
<td>Molar Mass by Freezing Point Depression/ PROP 507</td>
<td>1– 4, 6, 8, 14–16</td>
</tr>
<tr>
<td></td>
<td>(Lauric acid will be substituted for naphthalene.)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Chemical Kinetics (Week 1) / KINE 508</td>
<td>3, 4, 9, 11, 15, 16</td>
</tr>
<tr>
<td>7</td>
<td>Chemical Kinetics, (Week 2) / KINE 508</td>
<td>1–4, 9, 10, 11, 15, 16</td>
</tr>
<tr>
<td>8</td>
<td>Equilibrium/ EQUIL 392</td>
<td>1– 4, 7, 15, 16</td>
</tr>
<tr>
<td>9</td>
<td>Acid-Base Titration - pKₐ (Week 1)/ EQUIL 453</td>
<td>2, 3, 4, 10, 11, 15, 16</td>
</tr>
<tr>
<td>10</td>
<td>Acid-Base Titration - pKₐ (Week 2)/ EQUIL 453</td>
<td>1– 4, 10, 14, 15, 16</td>
</tr>
<tr>
<td>11</td>
<td>Cation Analysis (Week 1; knowns) / ANAL 523</td>
<td>4, 7, 12, 15, 16</td>
</tr>
<tr>
<td>12</td>
<td>Cation Analysis (Week 2; unknowns)/ ANAL 523</td>
<td>1, 4, 7, 12, 15, 16</td>
</tr>
<tr>
<td>13</td>
<td>Volumetric Determination of Hydrogen Peroxide/ ANAL 335</td>
<td>1– 4, 11, 15, 16</td>
</tr>
<tr>
<td>14</td>
<td>Electrochemical Cells &amp; Reduction Potentials/ ELEC 418</td>
<td>1– 4, 13, 15, 16</td>
</tr>
<tr>
<td>15</td>
<td>Completion of Week 14 EXP., clean-up, check out and final exam</td>
<td>1 – 17</td>
</tr>
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</table>

*The dates of all tests will be announced by the instructor.*

The instructor may modify this schedule slightly to accommodate tests.

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### Bergen Community College
### Core Competencies

#### CHM 241 General Chemistry Laboratory I

<table>
<thead>
<tr>
<th>Competency</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication</td>
<td>1, 17</td>
</tr>
<tr>
<td>2. Quantitative Reasoning</td>
<td>1, 2, 3, 5, 8 –14, 17</td>
</tr>
<tr>
<td>3. Critical Thinking</td>
<td>1 - 17</td>
</tr>
<tr>
<td>4. Civic Responsibility</td>
<td>15, 16</td>
</tr>
<tr>
<td>5. Technological and Information Fluency</td>
<td>2, 14, 16, 17</td>
</tr>
<tr>
<td>6. Personal Skills</td>
<td>1, 15, 16</td>
</tr>
<tr>
<td>7. Interpersonal Skills</td>
<td>5, 8, 9, 13, 14, 15, 16</td>
</tr>
<tr>
<td>8. Applied Knowledge</td>
<td>1 - 17</td>
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### CHM-241 LAB SCHEDULE*

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<tbody>
<tr>
<td>1</td>
<td>Check In / SOLUBILITY</td>
<td>PROP 421</td>
</tr>
<tr>
<td>2</td>
<td>SPECTROSCOPY</td>
<td>TECH 488</td>
</tr>
<tr>
<td>3</td>
<td>PREPARATION AND ANALYSIS OF A COPPER COMPOUND (Week 1)</td>
<td>SYNT 432</td>
</tr>
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<td>4</td>
<td>PREPARATION AND ANALYSIS OF A COPPER COMPOUND (WEEK 2)</td>
<td>SYNT 432</td>
</tr>
<tr>
<td>5</td>
<td>MOLAR MASS BY FREEZING POINT DEPRESSION</td>
<td>PROP 507</td>
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<td>6</td>
<td>CHEMICAL KINETICS (Week 1)</td>
<td>KINE 508</td>
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<td>7</td>
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<td>KINE 508</td>
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<tr>
<td>8</td>
<td>EQUILIBRIUM</td>
<td>EQUIL 392</td>
</tr>
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<td>9</td>
<td>ACID-BASE TITRATION - pK_a (Week 1)</td>
<td>EQUIL 453</td>
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<td>ACID-BASE TITRATION - PK_a (Week 2)</td>
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<td>CATION ANALYSIS (Week 1; knowns)</td>
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<td>VOLUMETRIC DETERMINATION OF HYDROGEN PEROXIDE</td>
<td>ANAL 335</td>
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<tr>
<td>14</td>
<td>ELECTROCHEMICAL CELLS &amp; REDUCTION POTENTIALS</td>
<td>ELEC 418</td>
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