# COURSE SYLLABUS

**Course Title:** General Chemistry II  
**Department:** Mathematics and Science  
**Curriculum:** Chemistry

**Course Code:** CHE*122  
**Course Type:** X

**Course Descriptors:** 
Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.

**Elective Type:** G/LAS/S

**Course Code:** CHE*122  
**Course Type:** X

**Course Descriptors:** 
Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.

**Elective Type:** G/LAS/S

**Prerequisites:** 
C- or better in General Chemistry I (CHE*121)

**Corequisites:** 
None

**Other Requirements:** 
Safety glasses, scientific calculator, technology skills

**Catalog Course Description:** 
Further study of the principles, theories and laws of chemistry. Topics include: thermodynamics, kinetics, chemical equilibria, oxidation and reduction reactions, descriptive chemistry of the elements and their compounds and an introduction to organic and nuclear chemistry. Lecture and laboratory.

**Topical Outline:** 
List course content in outline format.

**Lecture:**
1. Solutions, molarity, molality
2. Chemical kinetics and order
3. Chemical Equilibria: acid-base, solubility product, common ion effect
4. pH and pKa and buffers
5. Thermodynamics, enthalpy and Gibbs’ Free energy
6. Electrochemistry
7. Nuclear chemistry
8. Introductory organic and biochemistry
<table>
<thead>
<tr>
<th>Laboratory:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chemical kinetics</td>
</tr>
<tr>
<td>2. Equilibrium constant for chemical reactions</td>
</tr>
<tr>
<td>3. Solubility product</td>
</tr>
<tr>
<td>4. Buffer and pH</td>
</tr>
<tr>
<td>5. Determination of water hardness</td>
</tr>
<tr>
<td>6. Spot tests for common ions</td>
</tr>
<tr>
<td>7. Formulation of a qualitative analysis scheme</td>
</tr>
<tr>
<td>8. Qualitative analysis of Group I cations</td>
</tr>
<tr>
<td>9. Qualitative analysis of Group II cations</td>
</tr>
<tr>
<td>10. Qualitative analysis of Group III cations</td>
</tr>
<tr>
<td>11. Redox titration for iron</td>
</tr>
<tr>
<td>12. Voltaic cells</td>
</tr>
<tr>
<td>13. Synthesis of aspirin</td>
</tr>
</tbody>
</table>

**Upon successful completion of this course, the student will be able to do the following:**

1. express the state of equilibrium for chemical reactions and complete equilibria calculations
2. demonstrate the basic principles of thermodynamics, entropy and Gibbs’ Free Energy in chemical reactions and spontaneity
3. solve kinetic’s problems
4. calculate problems involving pH
5. determine hydrolysis reactions
6. demonstrate principles of electrochemistry
7. complete a qualitative analysis scheme on the following cations: Na, K, Mg, Ca, Sr, Ba, Cr, Mn, Fe, Co, Cu, Ag, Zn, Hg, Al, Sn, Pb
8. complete a qualitative analysis scheme on the following anions: (CO\(_3\))\(^{2-}\), NO\(_3\)\(^{-}\), SO\(_4\)\(^{2-}\), Br\(^{-}\), I\(^{-}\)
9. compare the chemical properties of non-transition elements and transition elements
10. identify the functional organic groups
11. name and draw the structure of organic compounds

**Outcomes:**
Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.

**Program:**
(Numbering reflects Program Outcomes as they appear in the college catalog)

N/A

**Competency Fulfilled:**
Scientific Knowledge & Understanding (SCKX) OR Scientific Reasoning (SCRX)

**Evaluation:**
List how the above outcomes will be assessed.

Assessment will be based on some or all of the following criteria:
- examinations
- quizzes
- laboratory reports

**Instructional Resources:**
List library (e.g. books, journals, on-line resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.

**Required:** Scientific calculator

**Desired:** Software
Slowinski, *Chemical Principles in the Laboratory*, 8th ed.; Thomson  
Chemical periodic Table, 8th ed.; Permachart |