

Purpose: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

Course Title – General Chemistry II

Course Prefix and Number – CHEM 1412

Department - Chemistry, Physics & Engineering

Division – Math & Science

Course Type: (check one)

- Academic General Education Course (from ACGM – but not in WCJC Core)
 Academic WCJC Core Course
 WECM course (This course is a Special Topics or Unique Needs Course: Y or N)

Semester Credit Hours # : Lecture Hours # : Lab/Other Hours # 4:**3:3**

Equated Pay hours for course – 4.8

Course Catalog Description - Chemical equilibrium; phase diagrams and spectrometry; acid-base concepts; thermodynamics; kinetics; electrochemistry; nuclear chemistry; an introduction to organic chemistry and descriptive inorganic chemistry. Basic laboratory experiments supporting theoretical principles presented in lecture; including introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports.

| |
|--------------------------|
| List Lab/ Other Hours |
| Lab Hours 3 |
| Clinical Hours |
| Practicum Hours |
| Other (list) |

Prerequisites/Co-requisites – Successful completion of **Chemistry 1411 with a grade of “C” or higher.**

Prepared by Frank Carey

Date 8-2-13

Reviewed by Department Head Kelley Whitley

Date 8-2-13

Accuracy Verified by Division Chair Kevin Dees

Date 8-2-13

Approved by Dean or Vice President of Instruction *gg hunt*

Date 8-2-13



I. Topical Outline – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, clinical or other non-lecture instruction):

Lecture:

| TOPICAL OUTLINE | DEDICATED INSTRUCTIONAL TIME |
|--|-------------------------------------|
| Oxidation and reduction reactions | Two Weeks |
| Thermochemistry | One week |
| Chemical kinetics | Two weeks |
| Molecular equilibrium | One week |
| Ionic equilibrium and hydrolysis | Two weeks |
| Buffers and buffer calculations | Two weeks |
| Solubility product calculations | One week |
| Nuclear Chemistry | One-half week |
| Organic Chemistry | One and one-half weeks |
| Electrochemistry | Two weeks |

Lab Work: Experiments (See dept. rubrics for grading criteria)

| EXPERIMENTS |
|---|
| Oxidation – Reduction reactions |
| Kinetics –rate of a chemical reaction |
| Determination of an Equilibrium Constant |
| Electrochemical Cells |
| Molecular Models and Bonding |
| Oxidation-reduction titration |
| Potentiometric Titration |
| Organic synthesis of aspirin |

II. Course Learning Outcomes

| Course Learning Outcomes | Methods of Assessment |
|--|---|
| <p>Upon successful completion of course, students will:</p> | |
| <p>Lecture:</p> | |
| <p>1. State the characteristics of liquids and solids, including phase diagrams and spectrometry.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>2. Articulate the importance of intermolecular interactions and predict trends in physical properties.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>3. Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>4. Identify and balance oxidation-reduction equations, and solve redox titration problems.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>5. Determine the rate of a reaction and its dependence on concentration, time, and temperature.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>6. Apply the principles of equilibrium to aqueous systems using LeChatelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>7. Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>8. Discuss the construction and operation of galvanic and electrolytic electrochemical cells, and determine standard and non-standard cell potentials.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>9. Define nuclear decay processes.</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>10. Describe basic principles of organic chemistry and descriptive inorganic chemistry</p> | <p>Quizzes, Final Exam, Exit Exams</p> |
| <p>Lab:</p> | <p>Labs assessed by:</p> |
| <p>1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.</p> | <p>lab notebook entry, formal lab report,</p> |
| <p>2. Demonstrate safe and proper handling of laboratory equipment and chemicals.</p> | <p>lab quiz, homework assignment,</p> |
| <p>3. Conduct basic laboratory experiments</p> | <p>and/or exam question</p> |

| | |
|---|--|
| <p>with proper laboratory techniques.</p> <ol style="list-style-type: none"> 4. Make careful and accurate experimental observations. 5. Relate physical observations and measurements to theoretical principles. 6. Interpret laboratory results and experimental data, and reach logical conclusions. 7. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports. 8. Design fundamental experiments involving principles of chemistry and chemical instrumentation. 9. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry. | |
|---|--|

III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

Whitten, K., Davis, R., Peck, M., & Stanley, G. (2010). Chemistry, 9th Edition. Cengage Learning. ISBN: 9781111085049

Hered, G. (2009). Chemistry Labs Laboratory Experiments for Chemistry 1411 & 1412. Cengage Learning. 9781111005474

IV. Suggested Course Maximum - Wharton and FBTC-Lecture 36 Lab 24 Sugarland- Lecture 36 Lab 32

V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

Chemistry Lab required for lab component

VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course
Evaluative Procedures:

1. Three major tests
2. Several ten-minute tests (announced and unannounced)
3. Problem assignments
4. Question assignments
5. Laboratory reports
6. Final examination
7. Dept. Gateway Exam (Dept. Head will provide a copy to you.)

The following method is used to arrive at the final grade:

| | |
|------------------------------|-----|
| All tests, assignments, etc. | 50% |
| Laboratory grade | 25% |
| Final examination | 25% |

The grade classifications as outlined in the College Catalog are employed:

| | |
|----------|-------------------------|
| A | Excellent 90-100 |
| B | Good 80-89 |
| C | Average 70-79 |
| D | Poor 60-69 |
| F | Failure 59-below |
| W | Withdrawn |

VII. Curriculum Checklist

- **Academic General Education Course** (from ACGM – but not in WCJC Core)
No additional documentation needed

- **Academic WCJC Core Course**
Attach the Core Curriculum Review Forms

- Critical Thinking
- Communication
- Empirical & Quantitative Skills
- Teamwork
- Social Responsibility
- Personal Responsibility

- **WECM Courses**
If needed, revise the Program SCANS Matrix & Competencies Checklist.



Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: **CHEM 1412**

Core Objective: **Critical Thinking Skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

| SLO Status | Student Learning Outcome (SLO) | Learning Activity | Assessment |
|---|---|--|--|
| The SLO is: | Insert SLO (from Administrative Master Syllabi) below | Provide a brief name and description of the sample learning activity: | Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective: |
| <input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | Upon successful completion of this course, students will interpret laboratory results and experimental data, and reach logical conclusions. | numerous experiments including (but not limited to) "Determining the Rate and Order of a Reaction" | lab notebook entry, formal lab report, lab quiz, homework assignment, and/or exam question |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |

Department Head: **Kelley Whitley**
 WCJC Core Curriculum Review Form-Life & Physical Science (April 2013)

Date: **8/7/2013**
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Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: CHEM 1412

Core Objective: **Communication Skills**—to include effective development, interpretation and expression of ideas through written, oral and visual communication

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

| SLO Status | Student Learning Outcome (SLO) | Learning Activity | Assessment |
|---|--|--|--|
| The SLO is: | Insert SLO (from Administrative Master Syllabi) below | Provide a brief name and description of the sample learning activity: | Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective: |
| <input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | Upon successful completion of this course, students will record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports. | numerous experiments including (but not limited to) "Synthesis of Aspirin" | lab notebook entry, formal lab report, portfolio, poster presentation, and/or oral presentation |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |

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**Wharton County
Junior College**

Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: **CHEM 1412**

Core Objective: **Empirical and Quantitative Skills**—to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

| SLO Status | Student Learning Outcome (SLO) | Learning Activity | Assessment |
|---|---|---|--|
| The SLO is: | Insert SLO (from Administrative Master Syllabi) below | Provide a brief name and description of the sample learning activity: | Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective: |
| <input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | Upon successful completion of this course students will analyze and perform calculations with the thermodynamic functions enthalpy, entropy, and free energy. | numerous experiments including (but not limited to) "Hess's Law" | lab notebook entry, formal lab report, portfolio, poster presentation, and/or oral presentation |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |

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Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: CHEM 1412

Core Objective: **Teamwork**—to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

| SLO Status | Student Learning Outcome (SLO) | Learning Activity | Assessment |
|---|--|--|--|
| The SLO is: | Insert SLO (from Administrative Master Syllabi) below | Provide a brief name and description of the sample learning activity: | Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective: |
| <input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | Upon successful completion of this course, students will conduct basic laboratory experiments with proper laboratory techniques (note that working effectively with lab partners is part of proper technique). | Numerous experiments (including but not limited to) "Potentiometric Titration" | rubric graded self evaluation and/or rubric graded peer evaluation |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |
| <input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated | | | |

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