Wharton County Junior College

Administrative Master Syllabus

Course Information

Course Title	General Chemistry II
Course Prefix, Num. and Title	CHEM 1412
Division	Math & Physical Sciences
Department	Chemistry
Course Type	Academic WCJC Core Course
Course Catalog Description	Continuation of CHEM 1411. 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.
Pre-Requisites	Successful completion of Chemistry 1411 with a grade of "C" or higher.
Co-Requisites	None

Semester Credit Hours

Total Semester Credit Hours (SCH): Lecture Hours: Lab/Other Hours	4:3:3
Equated Pay Hours	4.8
Lab/Other Hours Breakdown: Lab Hours	3
Lab/Other Hours Breakdown: Clinical Hours	0
Lab/Other Hours Breakdown: Practicum Hours	0
Other Hours Breakdown	0

Approval Signatures

Title	Signature	Date
Department Head:	Rocio Doherty	12/08/23
Division Chair:	Jennifer Mauch Digitally signed by Jennifer Mauch DN: cn=Jennifer Mauch, o, ou=Wharton County Junior College, email=mauchj@wcjc.edu, c=US Date: 2023.12.14 15:47:50 -06'00'	12 - 14 - 23
VPI:		

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Additional Course Information

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

Lecture Outline:

1. Liquids, Solids, and Intermolecular Forces
2. Solutions
3. Chemical Thermodynamics
4. Chemical Kinetics
5. Chemical Equilibrium
6. Ionic Equilibria I: Acids and Bases
7. Ionic Equilibria II: Buffers and Titration Curves
8. Ionic Equilibria III: The Solubility Product Principle
9. Electrochemistry
10. Nuclear Chemistry
11. Organic Chemistry

Laboratory Outline:
Syllabus and Safety
Lab Orientation / Keeping a Notebook

1. Liquids and Solids
2. Solutions and Concentrations
3. Iodine Clock
4. Determination of an Equilibrium Constant
5. LeChâtelier's Principle
6. Acid-base Equilibria (2 class periods)
7. Redox Titration
8. Thermodynamics
9. Electrochemistry
10. Nuclear Chemistry
11. Organic Worksheet

Course Learning Outcomes:

Learning Outcomes – Upon successful completion of this course, students will:

Lecture:

1. State the characteristics of liquids and solids, including phase diagrams and spectrometry.
2. Articulate the importance of intermolecular interactions and predict trends in physical properties.
3. Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships.
4. Identify and balance oxidation-reduction equations and solve redox titration problems.
5. Determine the rate of a reaction and its dependence on concentration, time, and temperature.
6. Apply the principles of equilibrium to aqueous systems using LeChâtelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.
7. Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.

8. Discuss the construction and operation of galvanic and electrolytic electrochemical cells and determine standard and non-standard cell potentials.
9. Define nuclear decay processes.
10. Describe basic principles of organic chemistry and descriptive inorganic chemistry.

Laboratory:

1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.
2. Demonstrate safe and proper handling of laboratory equipment and chemicals.
3. Conduct basic laboratory experiments with proper laboratory techniques.
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.

Methods of Assessment:

Outcomes assessed by:
Class work, homework assignments, quizzes and/or exams, posters/graphs/charts, oral

Lab outcomes assessed by:
Data entries, lab reports, lab quizzes, homework assignments and/or exam questions

Required text(s), optional text(s) and/or materials to be supplied by the student:

- *Interactive General Chemistry Atoms First* 2.0 + Achieve Access Card (Macmillan Learning, ISBN: 978-1-3195-7175-7)
- *CHEM 1412 Lab Manual, 2nd 3rd Edition*, Wharton County Junior College; (ISBN: 978-1-5339-4996-7)
- Scientific calculator (with logarithms and exponent functions)

Suggested Course Maximum:

Lecture: 36; Lab: 24

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

Chemistry laboratory classroom required for the lab component.

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

Lecture average:	
Exam average (3 or 4 exams)	30–55%
Other (homework, quizzes, projects, etc.)	0–25%
Laboratory average: (based on Laboratory average below)	25%
Final Exam average: (includes at least 50% comprehensive material)	20–25%
	100% course total

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Laboratory average*:	
Lab reports	20–75%
Other (formal lab reports, exercises, quizzes, etc.)	15 – 70%
Lab final	10%
	100% lab total

*Department policy: A student must earn a 60% laboratory grade or greater to pass the course.

The overall course grade is assigned as specified by the college:
A = 90–100
B = 80–89
C = 70–79
D = 60–69
F = below 60

Curriculum Checklist:

☐**Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.

☒**Administrative WCJC Core Course** – Attach the Core Curriculum Review Forms

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

☐**WECM Course** – If needed, revise the Program SCANS Matrix and Competencies Checklist

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Core Curriculum Review Form

Foundational Component Area: Core 030: Life & Physical Science

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
State Mandated	(Lab SLO #8) Design fundamental experiments involving principles of chemistry and chemical instrumentation.	Students design lab experiment	Lab report and lab final
State Mandated	(Lab SLO #6) Interpret laboratory results and experimental data and reach logical conclusions.	Lab report discussions	Lab report and lab final
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.

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Core Curriculum Review Form

Foundational Component Area: Core 030: Life & Physical Science

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
State Mandated	(Lab SLO #7) Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.	Formal lab report	Lab reports and presentation and/or project.
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.
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Core Curriculum Review Form

Foundational Component Area: Core 030: Life & Physical Science

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
State Mandated	(Lecture SLO #3) Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships.	Lab report calculations	Lab report and lab final
State Mandated	(Lecture SLO #7) Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.	Lab report calculations	Lab report and lab final
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.

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Core Curriculum Review Form

Foundational Component Area: Core 030: Life & Physical Science

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
State Mandated	(Lecture SLO #5) Determine the rate of a reaction and its dependence on concentration, time, and temperature.	Formal lab report	Student peer evaluation and lab report discussion rubric
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.
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