

NEW COURSE PROPOSAL

PROGRAM: BIOLOGICAL AND PHYSICAL SCIENCES

- 1. Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

CHEM 123. General Chemistry I Problem-Solving (1)

One hour of activity per week.

Prerequisite: Must be taken concurrently with CHEM 121

An instructor/peer-supervised interactive problem-solving session for students in CHEM 121 where students work in small groups on problems related to the content in CHEM 121.

2. Mode of Instruction.

	Units	Hours per Unit	Benchmark Enrollment
Lecture			
Seminar			
Laboratory			
Activity	1	1	30

- 3. Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

This course is an optional problem-solving session for the first semester general chemistry course (CHEM 121) and provides students with an interactive, problem-solving session where students work in small teams to solve problems in chemistry.

The course is designed to provide the student with a basic knowledge of the following:

- The scientific method and how it is used to approach scientific problems in chemistry
- History of the development of the field of chemistry
- Basic chemical principles relevant to all sub-fields of chemistry

Students who successfully complete this course will be able to:

- Evaluate a scientific measurement and distinguish between scientific data
- Describe matter and energy in terms of the units and terminology that is used by modern scientists
- Identify stoichiometric relationships and balance chemical equations
- Explain the structure of an atom in terms of its basic parts and properties
- Explain the interaction between electrons and light quantitatively
- Describe the properties of electrons and how they relate to chemical reactivity
- Identify the chemical properties of elements based on their periodic trends
- Explain the nature of the different types of chemical bonds in molecules
- Evaluate the properties of a gas phase species
- Rationalize chemical reactivity in terms of the thermodynamic properties of reactants and products

- 4. Is this a General Education Course**

YES

NO

If Yes, indicate GE category:

5. **Course Content in Outline Form.** [Be as brief as possible, but use as much space as necessary]

Scientific Measurement
The scientific method
SI units and the metric system
Significant Figures
Unit Conversion
Mass and Energy Units
Matter and Energy
States of Matter
Pure substances and mixtures
Atoms and Molecules
Temperature
Physical and chemical properties
Stoichiometry
The mole and Avagadro's Number
The chemical equation
Balancing chemical equations
Mole-to-Mass conversion
Solutions and Dilutions
Atoms and Elements
Names and Symbols
The nuclei of atoms
Radioactivity
Electrons and Photons
Particle-Wave duality
Electron arrangement in atoms
Intro to quantum theory
The photoelectron effect
Atomic spectra
The uncertainty principle
Atomic Orbitals
The Periodic Table
History of the periodic table
Metals and non-metals
Periodic trends
Main group elements and Transition metals
Electron affinity
Ionization
The Chemical Bond
Ionic and Covalent bonds
Electronegativity
Lewis structures
Oxidation number of atoms
The shape of molecules
Polarity
Hydrogen bonding
Gases
Pressure and temperature
Partial pressure
Ideal gas equation
Chemical Thermodynamics
Heat and work
Heat capacity
Entropy
State Functions
Reversible and irreversible changes
Enthalpy of reaction and of formation
Bond-dissociation and formation

6. References. [Provide 3 - 5 references on which this course is based and/or support it.]

Pauling, L. *General Chemistry*, 3rd Ed., 1970
Chang, R. *Chemistry*, 7th Ed., 2001
Pertucci, R.H.; Harwood, W.S.; Herring, G. *General Chemistry*, 8th Ed., 2001
Silberberg, M.S. *Chemistry*, 3rd Ed., 2003
Zumdahl, S.S.; Zumdahl, S. *Chemistry*, 2000

7. List Faculty Qualified to Teach This Course.

Dr. Simone Aloisio, Dr. Philip Hampton

8. Frequency.

a. Projected semesters to be offered: Fall X Spring Summer

9. New Resources Required.

None.

10. Consultation.

Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

Proposer of Course

Date