CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

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.

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<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
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<tr>
<td>Lecture</td>
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<td>Seminar</td>
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<td>Laboratory</td>
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<td>Activity</td>
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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:

NEWCRSFR 9/30/02
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
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