CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM: MULTIPLE PROGRAMS/ CHEMISTRY

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 371. PHYSICAL CHEMISTRY I (3)
   Three hours lecture per week.
   Prerequisite: CHEM 122 with a grade of C or better, PHYS 101 or PHYS 201, and MATH 150.
   This course is designed to introduce thermodynamics and kinetics. Areas covered will include the laws of thermodynamics, changes in state, chemical equilibrium, gas kinetic theory, rates of reactions, and experimental methods used to determine chemical reaction rates.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	3	1	36
Seminar			
Laboratory			
Activity			

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 required Chemistry majors, and may be taken by other science majors, who are interested in physical chemistry for their profession or graduate studies. This course will be an upper-division requirement for chemistry majors, or an elective for the minor in chemistry.

   Students who successfully complete this course will be able to:
   - Analyze, both qualitatively and quantitatively, how molecular shape, electronic structure, thermodynamics, kinetics, and intermolecular interactions are interrelated in Physical Chemistry.
   - Calculate the properties of an ideal and a real gas.
   - Relate work, heat and entropy to the laws that govern thermodynamics.
   - Apply the laws of thermodynamics to chemical reactions.
   - Explain phase change diagrams for pure substances and simple mixtures.
   - Derive the laws that relate thermodynamics to chemical equilibrium.
   - Determine the effect of changing surrounding conditions to chemical equilibrium.
   - Describe different electrochemical reactions quantitatively.
   - Apply the laws of thermodynamics and equilibrium to electrochemical reactions.
   - Explain collision theory of kinetics.
   - Determine rate laws for simple and complex chemical reactions.
   - Describe ion transport and molecular diffusion
   - Determine rate laws for simple surface reactions
   - Identify experimental methods used to determine reaction rates

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]*

Thermodynamics
Perfect and real gasses
Work and Heat
Conservation of Energy
Entropy
Gibbs Free Energy
Changes of State
Phase diagrams for pure substances and simple mixtures
Thermodynamics of mixtures
The Phase Rule
Chemical Reactions
Spontaneity
Le Chatlier's Principle
Electrochemical reactions
Kinetics
Collisions of gases
Ion transport and molecular diffusion
Rate Laws
Complex Reactions
Reaction dynamics
Kinetics at a surface

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

Atkins, P.W. *Physical Chemistry*, Oxford University Press, 7th Ed. 2001
Levine, I.N. *Physical Chemistry,* Mc-Graw-Hill, 5th Ed. 2001
McQuarrie, D.A.; Simon, J.D. *Physical Chemistry,* University Science Books, 1st Ed. 1997

7. List Faculty Qualified to Teach This Course.

Dr. Simone Aloisio, Dr. Phil 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.

_Simone Aloisio_____12-16-03_____
Proposer of Course Date