CHEM 373. Physical Chemistry II (3)
Three hours lecture per week.
Prerequisite: CHEM 122 with a grade of C or better, PHYS 101 or PHYS 201, and MATH 150.
Introduction to quantum mechanics, atomic and molecular structure, spectroscopy, and statistical mechanics.

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 elective for students in the Chemistry major, and may be taken by some other science majors, who are interested in physical chemistry for their profession or post-graduate studies. This course will be an upper-division elective for students wanting to receive a degree in chemistry, 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 (Big Ideas in Chemistry) are interrelated in Physical Chemistry.
- Describe classical mechanics and quantum mechanics as they apply to chemical systems.
- Calculate quantities using quantum mechanical principles
- Derive the atomic structure and spectroscopic properties of atoms using quantum mechanical principles.
- Derive the molecular orbitals for small molecules.
- Identify the symmetry elements of a molecule and its influence on electronic structure and electronic spectra.
- Discuss the rotational, vibrational, and electronic spectra of molecules

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]

   Quantum theory: principles, techniques, and applications
   Atomic structure and atomic spectra
   Molecular structure
   Symmetry: description and consequences
   Rotational and vibrational spectra
   Electronic transitions
   Magnetic resonance
   Statistical thermodynamics
   Statistical thermodynamics
6. References. [Provide 3 - 5 references on which this course is based and/or support it.]

Atkins, P.W. Physical Chemistry, 7th Ed. 2001
Levine, I.N. Physical Chemistry, 5th Ed. 2001
McQuarrie, D.A.; Simon, J.D. Physical Chemistry 1st Ed. 1997

7. List Faculty Qualified to Teach This Course.

Dr. Simone Aloisio

8. Frequency.
   a. Projected semesters to be offered: Fall _____  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.

Philip D. Hampton  October 4, 2004

Proposer of Course  Date
## Approvals

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<td>GE Committee Chair (If applicable)</td>
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Effective Semester: ________________________________
1. Course prefix, number, title, and units: CHEM 371. Physical Chemistry (3 units)

2. Program Area: Multiple Programs/Chemistry

**Recommend Approval**

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