UNIVERSITY OF THE PACIFIC
GRADUATE COURSE APPROVAL FORM

Please fill in all information. After all required signatures are obtained on page two, send to Research and Graduate Studies, Knoles Hall, 2nd Floor. Research and Graduate Studies will then forward to the Academic Affairs Committee, Office of the Provost, Anderson Hall, 2nd Floor.

Date: August 8, 2006
Contact Person: Dr. Silvio Rodriguez
Department: Chemistry
Phone: 946-2598

Please mark one:
- ADDITION
- REVISION
- DELETION

School or College: COP
Department: PCSP
Course Number: PCSP 222
Title: Thermodynamics of Pharmaceutical Systems
Units: 3
Minimum Number of Students: 6
Prerequisites: Graduate standing or permission of the instructor.

If replacing a course, old course title and number:

Catalog Description:
This is a classical course on the applications of thermodynamics to the study of pharmaceutical systems. The course includes a review of the basic principles of thermodynamics. These principles are used to describe and study physical and chemical transformations of pure substances and mixtures in pharmaceutical systems. Prerequisite: Graduate standing or permission of the instructor.

Please attach a syllabus.

What are the reasons for the new course (e.g., student needs, major, etc.), program changes or deletion of the program?
This is an important new course for all PCSP tracks.

If approved, when will this be implemented?
Fall, 2007

What is the anticipated impact on resources (Faculty, funds, library materials, etc.)?
What is the anticipated impact on resources (Faculty, funds, library materials, etc.)?

None.

Describe any special facilities, furnishings, or technology needs. List software needs, if any.

None.

APPROVAL PROCESS

1. Action by department requesting addition/change:
   Approved by: Celi Koke Date: 09/11/06

2. Action by the Curriculum and/or Graduate Studies Committee of the School/College:
   Approved by: 9/11/06

3. Action by the Dean of the School/College:
   Approved by: 9/12/06

4. Action by the Dean of the Library:
   Approved by: 10/20/06

5. Action by the Director of Educational Technology Services (if computer lab, software needed):
   Approved by: 11/4/06

6. Action by the Registrar:
   Approved by: 11-13-06

7. Action by the Graduate Studies Committee (as appropriate):
   Approved by: 11/16/06

8. Action by the Academic Affairs Committee:
   Approved by: Date:

After approval by the Academic Affairs Committee, information regarding new, revised, or deleted courses is sent to the Registrar for listing in or modifying the catalog.

Form revised: 9/4/03
Complete this section for Experimental Courses (149 or 249)

Approval recommended by Department

Approval by Curriculum Committee

Complete this section for Permanent Status Courses

Approval recommended by Department

Approval by Curriculum Committee

Approval by Faculty

1.) JUSTIFICATION FOR THE COURSE:
This course will prepare students to effectively apply thermodynamic methods to research involving academic and industrial pharmaceutical systems.

2.) STAFFING NEEDS:
Graduate faculty

3.) ESTIMATED CLASS ENROLLMENT:
Minimum of 4 students

4.) ANTICIPATED IMPACT ON CLASSROOM FACILITIES:
A lecture/discussion distance-learning room will be needed for this course.

5.) ANTICIPATED IMPACT ON ELECTRONIC TECHNOLOGY:
Current ET facilities are adequate.
Pharmaceutical and Chemical Sciences Graduate Program

Course Number: PCSP 222  
Course Title: Thermodynamics of Pharmaceutical Systems.

Department: PCSP  
Instructor(s): Dr. Silvio Rodriguez

Number of Weeks: 13  
Maximum Enrollment: 20  
Unit Value: 3

Lecture Hours per Week: 3  
Laboratory Hours per Week: 0

Discussion Hours per Week: 0  
Number of Labs per Semester: 0  
Experiential Hours per Week: 0

Course Description
An introduction to the applications of Thermodynamics to systems of pharmaceutical interest. This is a hybrid distance-learning/Blackboard.com course.

Prerequisites
Graduate standing or permission of instructor.

Teaching Methodology
This is a hybrid course with distance-learning lectures and Blackboard.com assignments.

Evaluation Methodology
The University Honor Code is an essential element in academic integrity. It is a violation of the Honor Code to give or receive information from another student during an examination, to use unauthorized sources during an examination, or to submit all or part of someone else’s work or ideas as one’s own. If a student violates the Honor Code, the faculty member may refer the matter to the Office of Student and Professional Affairs. If found guilty, the student may be penalized with failure of the assignment or failure of the course. The student may also be reprimanded or suspended from the University. A complete statement of the Honor Code may be found in the Student Handbook, “TIGER LORE”.

Attendance is expected at all class sessions.

Class assignments may be retained by the instructor to assess how the learning objectives of the course are met.

The instructor may be contacted during office hours or by email, phone, or via Blackboard.com.

Weighting of Assignments:
- Three Examinations: 60%
- Blackboard Assignments: 20%
- Final Exam: 20%

Assignment of Grades:
- > 90% - A
- 80% - B
- 70% - C
- 60% - D
- <60% - F
# COURSE SYLLABUS

Pharmaceutical and Chemical Sciences Graduate Program

<table>
<thead>
<tr>
<th>GOALS</th>
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<tbody>
<tr>
<td>1. To define and characterize a pharmaceutical system in terms of thermodynamic parameters.</td>
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<td>2. To characterize the strengths and limitations of thermodynamics in the study of a system.</td>
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<td>3. To apply thermodynamical relations to the solution of a wide range of assigned numerical problems.</td>
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<td>4. To be able to critically review the current scientific literature on the applications of thermodynamics to selected pharmaceutical systems.</td>
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<td>5. To search the literature and write a review article on a topic assigned by the lecturer.</td>
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OBJECTIVES

This course will introduce the basic principles of thermodynamics. These principles will be used to describe physical and chemical transformations of pure substances and mixtures in pharmaceutical systems. We will study solubility, solutions of nonelectrolytes, electrolytes and colligative properties in the context of modern theories of solvent structure. Acid-base equilibria and noncovalent binding equilibria of selected pharmaceutical systems will be discussed in detail.
COURSE SYLLABUS
Pharmaceutical and Chemical Sciences Graduate Program

LECTURER: Dr. Silvio Rodriguez
office: Classroom Building 118
email: srodriguez@pacific.edu
phone: (209) 946 2598 Fax: (209) 946 3213

TEXTBOOK: “Thermodynamics of Pharmaceutical Systems” by Ken Connors and recent publications from the literature.

TENTATIVE SCHEDULE (13 weeks; 26 lectures, 90 minutes each)

| REVIEW OF BASIC THERMODYNAMICS |
| Energy and the First Law of Thermodynamics (1 lecture) |
| The concept of Entropy (1 lecture) |
| The Gibbs Free Energy (1 lecture) |
| Equilibrium (2 lectures) |

| THERMODYNAMICS OF PHYSICAL PROCESSES |
| Introduction to Physical Processes (1 lecture) |
| Phase Transformations (1 lecture) |
| Solutions of Nonelectrolytes (3 lectures) |
| Solutions of Electrolytes (3 lectures) |
| Colligative Properties (2 lectures) |
| Solubility (2 lectures) |
| Surfaces and Interfaces (2 lectures) |

| THERMODYNAMICS OF CHEMICAL PROCESSES |
| Acid-Base Equilibria (3 lectures) |
| Electrical Work (2 lectures) |
| Noncovalent Binding Equilibria (2 lectures) |