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 415 MOLECULAR STRUCTURE DETERMINATION (4)
   Three hours lecture and three hours laboratory per week
   Prerequisite: CHEM 305 (or concurrent enrollment), CHEM 314, CHEM 315 or consent of instructor
   This course will examine modern techniques for the determination of organic, inorganic, and biological molecular structure. Topics include X-ray crystallography, nuclear magnetic resonance spectroscopy, mass spectrometry, infrared spectroscopy, ultraviolet spectroscopy, and molecular modeling. Lab fee required.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	3	1	36
Seminar			
Laboratory	1	3	18
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 typically taken by Chemistry majors, as well as other science majors, who are interested in understanding more advanced approaches to the characterization of organic and biological molecules. Students interested in post-graduate study in Chemistry should consider taking this course which is an upper-division elective for chemistry majors.

   Students who successfully complete this course will be able to:
   - Outline the development of the field of molecular structure determination.
   - Describe how molecular shape can be determined through the use of X-ray crystallographic, spectroscopy (nuclear magnetic resonance, infrared, and ultraviolet spectroscopies), mass spectrometry, and molecular modeling.
   - Describe how molecular shape, electronic structure, thermodynamics, kinetics, and intermolecular interactions affect molecular structure.
   - Demonstrate the ability to use state-of-the-art scientific instrumentation in the determination of the structure of organic, inorganic and biochemical molecules.
   - Compare strengths and limitations of various techniques used to determine molecular structure.
   - Describe how the various molecular structure determination techniques and instrumentation work
   - Determine the structure of an organic, inorganic, or biological molecule using X-ray crystallography; nuclear magnetic resonance, infrared, and ultraviolet spectroscopies; mass spectrometry; and molecular modeling.
   - Interpret, discuss, and evaluate a primary literature article

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]*

Molecular Modeling
Conformational Equilibria
X-ray Crystallography
Proton NMR
Carbon NMR
Other Nuclei NMR
Correlation NMR
Dynamic NMR
Nuclear Overhauser Effect
Mass Spectrometry
Infrared Spectroscopy
Ultraviolet and Chiroptical Spectroscopy

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

Crews, P.; Rodriguez, J.; Jaspars, M. *Organic Structure Analysis, Topics in Organic Chemistry*, Oxford University Press, 1998.
Lambert, J. B.; Shurvell, H. F.; Lightner, D. A.; Cooks, R. G. *Organic Structural Spectroscopy*, MacMillen, 1st Ed, 1997.
Silverstein, R. M.; Webster, F. X. *Spectrometric Identification of Organic Compounds*, Wiley, 1st Ed., 1997.
Friebolin, H.; Becconsall, J. K. *Basic One- and Two-Dimensional NMR Spectroscopy*, Oxford University Press, 3rd Revised Ed., 1998.
Braun, S.; Kalinowski, H.-O.; Berger, S. *100 and More Basic NMR Experiments: A Practical Course*, Taylor and Francis, 1996.
Field, L. D.; Sternhell, S.; Kalman, J. R. *Organic Structures from Spectra*, Elsevier, 3rd Ed., 2002.

7. List Faculty Qualified to Teach This Course.

Dr. Phil Hampton

8. Frequency.

a. Projected semesters to be offered: Fall __X___ Spring _____ Summer _____
Alternating with other upper-level chemistry electives on a two-year cycle.

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.

__Phil Hampton_____12-16-03_____
Proposer of Course Date