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.

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<tr>
<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>3</td>
<td>1</td>
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<tr>
<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 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.]


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.

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__Phil Hampton__________________________12-16-03_______________________
Proposer of Course Date