CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

COURSE MODIFICATION PROPOSAL

Courses must be submitted by October 15, 2010, and finalized by the end of the fall semester to make the next catalog (2011-12) production

DATE (CHANGE DATE EACH TIME REVISED): 10.25.10;REV 12.9.10

PROGRAM AREA(S) : CHEMISTRY

Directions: All of sections of this form must be completed for course modifications. Use YELLOWED areas to enter data. All documents are stand alone sources of course information.

1. Course Information.

[Follow accepted catalog format.] ***(Add additional prefixes i f cross-listed)***

OLD

Prefix CHEM Course# 415 Title **MOLECULAR STRUCTURE DETERMINATION** Units (4)
3 hours lecture per week
3 hours laboratory per week

X Prerequisites: CHEM 305 (or concurrent enrollment), CHEM 314, CHEM 315 or consent of instructor
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols):
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.

General Education Categories
X Lab Fee Requested

Course Level:
X Undergraduate
Post-bac/Credential
Graduate

Graded
CR/NC
X A - F
Optional (Student's choice)

Repeatable for up to units
Total Completions
Multiple Enrollment in same semester

NEW

Prefix CHEM Course# 415 Title **MOLECULAR STRUCTURE DETERMINATION** Units (4)
3 hours lecture per week
3 hours laboratory per week

X Prerequisites: CHEM 305 (or concurrent enrollment), CHEM 314, CHEM 315 or consent of instructor
Consent of Instructor Required for Enrollment
Corequisites:

Catalog Description (Do not use any symbols)**:**
Examines modern techniques for the determination of the structure of organic and inorganic compounds. Topics include X-ray crystallography, nuclear magnetic resonance spectroscopy, mass spectrometry, infrared spectroscopy, ultraviolet spectroscopy, and molecular modeling.

General Education Categories
X Lab Fee Requested

Course Level:
X Undergraduate
Post-bac/Credential
Graduate

Graded
CR/NC
X A - F
Optional (Student's choice)

Repeatable for up to units
Total Completions
Multiple Enrollment in same semester

2. Mode of Instruction (Hours per Unit are defaulted)

Hegis Code(s)_____
(Provided by the Dean)

Existing

	Units	Hours Per Unit	Benchmark Enrollment	Graded
Lecture	3	1	12	X
Seminar		1		
Lab	1	3	12	X
Activity		2		
Field Studies				
Indep Study				
Other blank				

Proposed

	Units	Hours Per Unit	Benchmark Enrollment	Graded	CS No. (filled out by Dean)
Lecture	3	1	24	X	
Seminar		1			
Lab	1	3	12	X	
Activity		2			
Field Studies					
Indep Study					
Other blank					

3. Course Attributes:

General Education Categories: All courses with GE category notations (including deletions) must be submitted to the GE website: http://summit.csuci.edu/geapproval. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)
- A-1 Oral Communication
- A-2 English Writing
- A-3 Critical Thinking

B (Mathematics, Sciences & Technology)
- B-1 Physical Sciences
- B-2 Life Sciences – Biology
- B-3 Mathematics – Mathematics and Applications
- B-4 Computers and Information Technology

C (Fine Arts, Literature, Languages & Cultures)
- C-1 Art
- C-2 Literature Courses
- C-3a Language
- C-3b Multicultural

D (Social Perspectives)

E (Human Psychological and Physiological Perspectives)

UDIGE/INTD Interdisciplinary

Meets University Writing Requirement

Meets University Language Requirement

American Institutions, Title V Section 40404: Government US Constitution US History
Refer to website, Exec Order 405, for more information: http://senate.csuci.edu/comm/curriculum/resources.htm

Service Learning Course (Approval from the Center for Community Engagement must be received before you can request this course attribute).

4. Justification and Requirements for the Course. *[Make a brief statement to justify the need for the course]*

OLD	**NEW**
Requirement for the Major/Minor	Requirement for the Major/Minor
X Elective for the Major/Minor	X Elective for the Major/Minor
Free Elective	Free Elective

Submit Program Modification if this course changes your program.

5. Student Learning Outcomes. (List in numerical order. You may wish to visit resource information at the following website: http://senate.csuci.edu/comm/curriculum/resources.htm)

Upon completion of the course, the student will be able to: **OLD**	Upon completion of the course, the student will be able to: **NEW**
• Outline the development of the field of molecular structure determination.	• 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 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.	• 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,	• Demonstrate the ability to use state-of-the-art scientific instrumentation in the determination of the structure of organic

inorganic and biochemical molecules.	and inorganic molecules.
• Compare strengths and limitations of various techniques used to determine molecular structure.	• Compare strengths and limitations of various techniques used to determine molecular structure.
• Describe how the various molecular structure determination techniques and instrumentation work	• 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.	• 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	• Interpret, discuss, and evaluate a primary literature article

6. Course Content in Outline Form. (Be as brief as possible, but use as much space as necessary)

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

Does this course content overlap with a course offered in your academic program? Yes ☐ **No** X
If YES, what course(s) and provide a justification of the overlap.

Does this course content overlap a course offered in another academic area? Yes ☐ **No** X
If YES, what course(s) and provide a justification of the overlap.

Overlapping courses require Chairs' signatures.

7. Cross-listed Courses (Please note each prefix in item No. 1)

A. List cross-listed courses (Signature of Academic Chair(s) of the other academic area(s) is required).
B. List each cross-listed prefix for the course:
C. Program responsible for staffing:

8. References. *[Provide 3-5 references]*

OLD

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.

NEW

Simpson, J. H. *Organic Structure Determination: Using 2D NMR Spectroscopy*, Elsevier, 2008.
Neil E. Jacobsen, NMR Spectroscopy Explained, Wiley, 2007
Silverstein, R. M.; Webster, F. X.; Kiemle, D. J. Spectrophotometric Identification of Organic Compounds, Seventh Ed., Wiley, 2005.
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.
Field, L. D.; Sternhell, S.; Kalman, J. R. *Organic Structures from Spectra*, Elsevier, 3rd Ed., 2002.

9. Tenure Track Faculty qualified to teach this course.
Philip Hampton

10. Requested Effective Date or First Semester offered: Spring 2011

11. New Resource Requested: Yes **No** X
If YES, list the resources needed.

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)

B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)

C. Facility/Space/Transportation Needs:

D. Lab Fee Requested: Yes X (already approved) **No** **(Refer to the Dean's Office for additional processing)**
E. Other.

12. Indicate Changes and Justification for Each. *[Check all that apply and follow with justification. Be as brief as possible but, use as much space as necessary.]*

- Course title
- Prefix/suffix
- Course number
- Units
- Staffing formula and enrollment limits
- Prerequisites/Corequisites
- X Catalog description
- Mode of Instruction
- X Course Content
- X Course Learning Outcomes
- X References
- GE
- Other
- Reactivate Course

Justification: The Chemistry Program determined that it was not possible to cover the content of organic, inorganic, and biological molecular structure determination in a single semester-long course. This course has been modified so that it focuses on the determination of the molecular structure of small molecules consisting of organic and inorganic compounds.

13. Will this course modification alter any degree, credential, certificate, or minor in your program? Yes **No** X
If, YES attach a program update or program modification form for all programs affected.
Priority deadline for New Minors and Programs: October 4, 2010 of preceding year.
Priority deadline for Course Proposals and Modifications: October 15, 2010.
Last day to submit forms to be considered during the current academic year: April 15th.

Phil Hampton — 9/16/10

Proposer(s) of Course Modification — Date
Type in name. Signatures will be collected after Curriculum approval.

Approval Sheet

Course: CHEM 415

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
General Education Chair		
	Signature	Date
Center for Intl Affairs Director		
	Signature	Date
Center for Integrative Studies Director		
	Signature	Date
Center for Multicultural Engagement Director		
	Signature	Date
Center for Civic Engagement and Service Learning Director		
	Signature	Date
Curriculum Chair		
	Signature	Date
Dean of Faculty		
	Signature	Date