CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM: BIOLOGICAL AND PHYSICAL SCIENCES

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 311. ORGANIC CHEMISTRY I (3)
   Three hours of lecture per week
   Prerequisites: CHEM 122 with a grade of C or better
   The structure and reactions of simple organic molecules and spectroscopic techniques (NMR, GC-MS, IR, and UV-visible) used to characterize molecules. Lab fee required.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	3	1	50
Seminar			
Laboratory			
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]*

   Organic Chemistry is the study of chemical compounds that contain carbon and their chemical reactions. This course is the first semester of a two semester sequence that is generally an admission requirement for medical, veterinary, dental, or pharmacy schools. In combination with CHEM 312, CHEM 314, CHEM 315, and CHEM 400, or CHEM 312 and CHEM 318, this course completes the chemistry requirements for the Biology major.

   Students who successfully complete this course will be able to:
   - Outline the development of the field of organic chemistry from a historical perspective and how organic chemistry has impacted society
   - Describe the scientific method and how it is used to approach the study of organic molecules
   - Identify functional groups and how they serve as building blocks of more complex organic molecules
   - Evaluate the relationship between the geometric structures of various molecules
   - Explain the behavior of organic reactions using their knowledge of thermodynamics and kinetics and the geometric and electronic structures of organic molecules
   - Explain the basic scientific principles behind chromatography, infrared and ultraviolet spectrophotometry, mass spectrometry, and nuclear magnetic resonance spectrometry, and the limitations of these techniques
   - Interpret infrared, mass, and nuclear magnetic resonance spectra of aliphatic organic molecules containing one functional group
   - Identify the reactions and synthesis of alkyl halides, alkenes, alkynes, and dienes

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]*

   Structure and Bonding
   Historical context of the development of organic chemistry

A review of atomic and molecular structure
Valence bond description of bonds
Resonance and electron-pushing
Molecular orbital description of bonds
Properties of bonds

Acid-Base Chemistry
Brønsted and Lewis Definitions of Acids and Bases
Acid-base equilibria
Electron-pushing in acid-base reactions

Structures and Naming of Organic Molecules
Functional groups
Constitutional isomerism
Representations of organic molecules
IUPAC naming of alkanes and alkyl halides
Configurational isomerism
Chirality, optical activity, and representations of chiral molecules
Conformational analysis

Spectroscopic Determination of Molecular Structure
Degree of unsaturation
Mass Spectrometry (MS and GC/MS)
Infrared spectroscopy (IR)
Nuclear Magnetic Resonance spectroscopy (NMR)
Ultraviolet-visible spectroscopy (UV-vis)

Overview of Organic Reactions
Classifications of organic reactions and reaction mechanisms
Overview of organic reaction mechanisms
Electron pushing in polar and radical mechanisms
Kinetics and thermodynamics of organic reactions
Reaction energy diagrams

Alkyl Halides and their Synthesis
Radical halogenation of alkane
Radical structure and stability
Conversion of alcohols to alkyl halides

Nucleophilic Substitution and Elimination
Substitution vs. elimination and nucleophile structure
Substitution mechanisms
Carbocation structure and stability
Elimination mechanisms

Alkenes and their Synthesis
Naming of alkenes and E/Z notation
Addition reactions of alkenes
Oxidation/ reduction of alkenes

Synthesis Reactions
Organometallics and coupling reactions

Dienes and their reactions
Diels-Alder Reaction

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

McMurray, J. *Organic Chemistry*, 5th Ed., 2000
Weeks, D. P. *Pushing Electrons*, 3rd Ed., 1998
Wade, L. G., Jr. *Organic Chemistry*, 5th Ed., 2002
Bruice, P. *Organic Chemistry*, 3rd Ed., 2000

7. List Faculty Qualified to Teach This Course.

Dr. Philip Hampton

8. Frequency.

a. Projected semesters to be offered: Fall __X___ 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 Hampton_____1/8/03_____
Proposer of Course Date