CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM AREA _____BIOLOGY_____

1. **Catalog Description of the Course. 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.]*

   BIOL 505 MOLECULAR STRUCTURE (4)
   Three hours of lecture and three hours of laboratory per week.
   Prerequisite: BIOL 400 or permission of instructor

This course will examine the structural biology of proteins. Topics include general principles of protein structure, the biochemical function of proteins, the relationship of protein structure to its function and experimental approaches to determining and predicting protein structure and function.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	3	1	15
Seminar			
Laboratory	1	3	15
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]*

   Molecular structure is a required course for graduate students in the Professional Master of Science Degree Program in Bioinformatics (Biotechnology emphasis).

   Students who successfully complete this course will be able to:
   - Describe basic principles of protein structure including protein structure motifs, properties of alpha helices and beta sheets and protein folding.
   - Explain how a protein's conformation determines its biochemical activity.
   - Describe how a protein's structure enables binding to other molecules.
   - Explain how a protein's function can be deduced from its primary structure.
   - Describe the techniques used for solving the 3-D structure of a protein.

4. **Is this a General Education Course** **YES** **NO**
   If Yes, indicate GE category:

A (English Language, Communication, Critical Thinking)	
B (Mathematics & Sciences)	
C (Fine Arts, Literature, Languages & Cultures)	
D (Social Perspectives)	
E (Human Psychological and Physiological Perspectives)	

5. **Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*

I. Protein Sequence and Structure

Primary structure

Secondary Structure
Properties of the Alpha Helix and Beta sheet
Prediction of Secondary Structure
Tertiary Structure
Membrane Protein Structure
Protein Stability
The Protein Domain
Protein Motifs
Quaternary Structure

II. Protein Structure and Function
The Structural Basis of Protein Function
Recognition, Complementarity and Active Sites
Flexibility and Protein Function
Location and nature of Binding Sites
Functional Properties of Structural Proteins
Catalysis
Multifunctional Enzymes

III. Deducing protein function from Sequence
Sequence Alignment and Comparison
Protein Profiling
Experimental Tools for Probing Protein Function
Divergent and Convergent Evolution
Protein Superfamilies
Strategies for Identifying Binding Sites
Strategies for Identifying Catalytic Residues

IV. Protein Structure Determination
The Interpretation of Structural Information
Structure Determination by X-Ray Crystallography and NMR
Quality and Representation of Crystal and NMR Structures

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

Lesk. (2001). *Introduction to Protein Architecture: The structural biology of proteins*. Oxford University Press.
Branden and Tooze. (1999) *Introduction to Protein Structure, 2nd edition*. Garland Publishing.
Fasman. (1989). *Prediction of protein structure and the principles of protein conformation*. Plenum Press.
McRee and David. (1999) *Practical Protein Crystallography, 2nd edition*. Academic Press.
Petsko and Ringe. (2003) *Protein Structure and function*. New Science Press.

7. List Faculty Qualified to Teach This Course.

Biology Faculty

8. Frequency.
a. Projected semesters to be offered: Fall ___x__ Spring _____ Summer _____

9. New Resources Required.
a. Computer (data processing), audio visual, broadcasting needs, other equipment
b. Library needs
c. Facility/space needs

Laboratories for this course will be conducted in the Molecular Structure lab in the Science building which is currently undergoing renovation.

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.

____Nancy Mozingo 31 October 2003_____
Proposer of Course Date