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 461. BIOCHEMISTRY II (4)
   Three hours lecture and three hours laboratory per week.
   Prerequisite: CHEM 305 (or concurrent enrollment), CHEM 460 with a grade of C or better or consent of instructor.
   This course will focus on the biochemical reactions that occur in cells. Topcis include biosynthesis of proteins, lipids and nucleic acids, photosynthesis, cellular metabolism, and gene expression. 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 a continuation of CHEM 460 and is a requirement for chemistry majors pursuing a biochemistry option. Additionally, all students interested in pursing medical, veterinary, dental or pharmacology school, or graduate studies in biochemistry will find this course helpful for admission into a competitive program.

   Students who successfully complete this course will be able to:
   - Outline the development of the field of biochemistry from historical benchmarks to the most current examples of biotechnology's impact on medicine and society.
   - Describe how molecular shape, electronic structure, thermodynamics, kinetics, and intermolecular interactions affect the structure, properties, and reactions of biological molecules.
   - Explain the overall schema of metabolic strategy, regulation and disease.
   - Describe major biochemical pathways, including energy flow, anabolic and catabolic pathways.
   - Explain the regulatory mechanisms of these pathways.
   - Integrate their general knowledge of biomolecular structure, function and metabolism with important biological and medical questions, such as immune responses, carcinogenesis, and signal transduction.
   - 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]*

Introduction to Metabolism
- Energy content of molecules and thermodynamics
- Oxidation-reduction reactions and electrochemistry
- Regulatory strategies in metabolism

Glycolysis and Gluconeogenesis
- Energy conversion
- Gluconeogenesis
- Regulation of glycolysis

Citric Acid Cycle
- Enzymes in the Citric Acid Cycle
- Regulation of the Citric Acid Cycle

Electron-Transport and Oxidative Phosphorylation
- Electron-transport
- Oxidative phosphorylation and regulation

Photosynthesis
- Light reactions and biosynthesis of ATP
- Dark reactions, the Calvin Cycle and the Pentose Phosphate Pathway

Lipid Metabolism
- Fatty acid synthesis and degradation
- Regulation of fatty acid synthesis and degradation
- Membrane lipid synthesis

Amino and Nucleic Acid Metabolism
- Protein degradation
- Synthesis and degradation of amino acids

Nucleic Acid Metabolism
- Purine biosynthesis and regulation
- Pyrimidine biosynthesis and regulation

The control of gene expression
- Structure of genes in pro- and eukaroyotes
- Activation and repression of transcription
- Chromatin structure
- Post-transcriptional regulation

Responding to stimuli
- Olfaction and vision
- The immune response
- Molecular motors

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

Berg, J.M.; Tymoczko, J.L.; Stryer, L. *Biochemistry*, Freeman, 5th Ed., 2002
Gilbert, H. F. *Basic Concepts in Biochemistry- A Student's Survival Guide*, McGraw-Hill, 2nd Ed., 2000
Nelson, D. L.; Cox, M. M. Lehninger, Principles of Biochemistry, Worth, 3rd Ed., 2000
Stryer, L. *Biochemistry*, Freeman, 4th Ed., 1995
Voet, D.; Voet, J. G.; Pratt, C. W. *Fundamentals of Biochemistry*, Wiley, 1st Ed., 2002

7. List Faculty Qualified to Teach This Course.

Dr. Philip Hampton

8. Frequency.

a. Projected semesters to be offered: Fall ___ Spring _X__ 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.

_Phil Hampton_____12-16-03_____
Proposer of Course Date