CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM AREAS _____BIOLOGICAL AND PHYSICAL SCIENCES, MATH AND COMPUTER SCIENCE

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.]*

MATHP 452 Computational Bioinformatics (4)
Four hours of lecture in the lab per week.

Prerequisite: Programming skills, Statistics, Biol 201 recommended, or consent of the instructor.
Basic computational models used in molecular biology and chemistry will be introduced. Topics include algorithms for string alignments, dynamic programming, structural superposition algorithms, computing with differential information, 3D motifs, Hidden Markov Models, phylogenetic trees, statistical/ information techniques for pattern recognition, genetic algorithms. Same as COMP 452

.

2. **Mode of Instruction.**

	Units	**Hours per Unit**	**Benchmark Enrollment**
Lecture	___4_____	___1_____	__24_____
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]*

The course is an elective course for Computer Science an Mathematics majors.

Through this course, students will be able to –

- Use internet resources and publicaly available bio- data bases
- Understand protein classification, structure and function
- Design and implement software solutions in bioinformatics
- Analyze bio-data by building data models
- Use data mining and Artificial Intelegence methods to extract patterns
- Apply statistical methods to analyze patterns of similarities in bio-sequences
- Use simulations tools to understand central concepts
- Perform independent research on computational projects
- Work in teams.
- Organize and express ideas clearly and convincingly in oral, electronic, visual, and written forms, and as an interactive computer simulation..

This course is not designed to satisfy the University Writing or Language requirements.

4. Is this a General Education Course **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]*

-Basic computational models in molecular biology
-Algorithms for string alignments
- Dynamic programming
- Bioprogramming (Perl, Ruby, Java, MySQL).
- Structural superposition algorithms,
- Computing with differential information
-3D motifs
- Hidden Markov Models
- Phylogenetic trees
- Statistical/ information techniques for pattern recognition
- Genetic algorithms
-Microarrays
- Proteomics

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

1) Bioinformatics: Sequence and Genome Analysis, David W. Mount, Cambridge Univ Pr ; ISBN: 0521629713 ; (1999)
2) Bioinformatics: The Machine Learning Approach, by Pierre Baldi, Sren Brunak, MIT Press; ISBN: 026202506X ; 2nd edition (2001)
3) DNA Microarrays and Gene Expression : From Experiments to Data Analysis and Modeling by Pierre Baldi G., Wesley Hatfield, Wesley G. Hatfield, Cambridge University Press; ISBN: 0521800226 ; (2002)

7. List Faculty Qualified to Teach This Course.

Computer Science faculty with expertise in Bioinformatics.

8. Frequency.

a. Projected semesters to be offered: Fall ___X__ Spring _X____ Summer _____

9. New Resources Required.

a. Computer (data processing), audio visual, broadcasting needs, other equipment

Use of existing computer lab.

b. Library needs

none

c. Facility/space needs

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.

__Ivona Grzegorczyk_____2/15/04_____
Proposer of Course Date