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.]*

COMP 432 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 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.

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 majors.

Through this course, students will be able to –

- Use internet resources and publicaly available bio- data bases
- Explain the role and importance of computational methods in modern medicine
- Explain protein classification, structure and function
- Design and implement software solutions in bioinformatics
- Analyze bio-data by building data models
- Apply data mining and Artificial Intelegence methods to extract patterns
- Apply statistical methods to analyze patterns of similarities in bio-sequences
- Apply simulations tools to present 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..

4. **Is this a General Education Course**   **YES**
   If Yes, indicate GE category:

A (English Language, Communication, Critical Thinking)	

B (Mathematics & Sciences)	**B2, B4**
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
- Role and importance of computational methods in modern medicine
-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

   c.   Facility/space needs

10. Consultation.
   Attach consultation sheet from all program areas, Library, and others (if necessary)

Biology : Ching Wang and Louise Lutz-Mann

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

_____
Proposer of Course   Date

Approvals

_____
Program Coordinator   Date

_____
GE Committee Chair   Date
(If applicable)

_____
Curriculum Committee Chair   Date

_____
Dean   Date

Effective Semester: _____

1. Course prefix, number, title, and units: _____COMP 429 COMPUTER NETWORKS (3)

2. Program Areas: _____BIOLOGICAL AND PHYSICAL SCIENCES, MATH AND COMPUTER SCIENCE

Recommend Approval

Program Area/Unit	Program/Unit Coordinator	YES	NO (attach objections)	Date
Art				
Business & Economics				
Education				
ESRM				
Humanities				
Liberal Studies				
Mathematics & CS				
Sciences				
Library*				
Information Technology*				

* If needed