

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 571. BIOLOGICALLY INSPIRED COMPUTING (3)

Three hours of lecture in the lab per week.

Prerequisite: Admission to the Computer Science or Mathematics Graduate Program

Study of computing paradigms that have roots in Biology including Neuromorphic Systems, Evolutionary Systems, Genetic Programming, Swarm Intelligence and Artificial Immune Systems.

- 2. Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	<u>3</u>	<u>1</u>	<u>24</u>
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]*

This course is an elective for graduate students in MS in Mathematics and MS in Computer Science programs. Biology and Psychology have always been sources of inspiration for computing science, so it's important to explore them for new ideas. Novel methodologies and techniques allow to address problems in unconventional ways that are very often the only ways to solve problems. Biologically inspired Computational Intelligence uses sub-symbolic approaches that are contrasted with analytical systems that use symbols to construct problem solutions.

Through this course, students will be able to

- Design systems that use unconventional techniques to solve problems for which traditional methods failed to provide satisfactory solutions.
- Explore Biological Sciences for further inspirations.
- Apply computational methods to other fields
- Design algorithms to solve various problems
- Design various programming solutions and apply them

- 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]*

1. Artificial immune systems
2. Neurocomputing
3. Evolutionary algorithms
4. Genetic programming
5. Swarm intelligence
6. Artificial life
7. Emergent systems
8. Complex (adaptive) systems
9. Developmental algorithms
10. Embriological algorithms
11. Information processing in cells and tissues
12. Biocomputation
13. Biosystems

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

1. de Castro and Von Zuben, *Biologically Inspired Computing*, Idea Group Inc. (IGI), 2004, ISBN TBD
2. Bentley, *Digital Biology*, Simon & Schuster, 2002, ISBN 0743204476
3. Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, Scribner, 2002, ISBN 0684868768
4. de Castro and Timmis, *Artificial Immune Systems*, Springer, 2002, ISBN 1-85233-594-7

7. List Faculty Qualified to Teach This Course.

All Computer Science faculty.

8. Frequency.

- a. Projected semesters to be offered: Fall _____ 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.

P.Smith , AJ Bieszczad Oct 31, 2003

Proposer of Course

Date

Approvals

Program Coordinator	Date
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GE Committee Chair (If applicable)	Date
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Curriculum Committee Chair	Date
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Dean	Date
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Effective Semester: _____

California State University Channel Islands
New Course Proposal Consultation Sheet

Course prefix, number, title, and units: _____ COMP 571 BIOLOGICALLY INSPIRED COMPUTING (3)

2. Program Areas: _____ 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