

METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

Form rev. 10/12

OMNIBUS* COURSE SYLLABUS

School of Letters, Art, and Sciences

Department: Mathematical & Computer Sciences **Instructor:** Judith S. Gurka

Prefix and Course Number: CS 390J **Semester/year offered:** Spring 2014

Banner Number (for Academic and Student Affairs use): _____

(Students registering after Census date will be ineligible for the COF stipend and must pay the full tuition for the omnibus course. Please see COF-FAQ for details regarding registration deadlines: http://www.mscd.edu/news/cof/cof_faq.htm)

Course Title: Bio-Inspired Computing

Credit Hours: 4 (4 + 0)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 60 Lab 0 Internship 0 Practicum 0 Other :_Additional Student work hours 120

Meeting Times/Dates: T/Th 12:00–1:50

Grading Mode(s): Letter

Schedule Type(s): Lecture

Prerequisites: CS 2400 and 8 hours upper-division CS courses, with grades of 'C' or better, or permission of instructor

Approved - Omnibus course:

	<u>12. 7. 2013</u>
Department Chair OR Program Director	Date
	<u>12. 17. 2013</u>
Dean OR Associate Dean of School	Date
	<u>12/18/13</u>
Office of Academic and Student Affairs Designee	Date

Approved - Field Experience/Internship Only:

Location of Internship

Faculty Evaluation Group

Date

Field Supervisor**

Date

**Approval by the Field Supervisor is required and must be indicated by the original signature of that supervisor on the syllabus.

*Guidelines as set forth in Section V. F. of the *MSU Denver Curriculum Guidelines, Policies and Procedures* must be followed. A copy of the omnibus course syllabus must be on file in the Office of Academic and Student Affairs prior to the listing of the course in any semester schedule.

Corequisites: none

Banner Enforced:

Prerequisite(s): CS 2400 with grade of C or better

Corequisite(s): none

Prerequisite(s) or Corequisite(s): none

Course Description:

This course will cover several different bio-inspired computing paradigms and their associated algorithms, including genetic programming, neural network programming, and swarm intelligence. Students will read, write, and experiment with programs in each area.

Required Reading Materials

Floreano & Mattiussi (2008), *Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies*, Cambridge, MA: MIT Press (or similar text) and course notes

Evaluation of Student Performance (*format* - 1, a, i, ii, etc.):

1. Programs, writing and reading
2. Exercises
3. Tests
4. Final Exam

Specific *Measurable* Student Behavioral Learning Objectives (*format* - 1, a, i, ii, etc.):

1. Design, create, and test programs
2. Read and analyze existing programs for semantics and efficiency
3. Compare and evaluate paradigms for problem suitability
4. Assess alternative versions of algorithms

Detailed outline of course content (major topics and subtopics) or outline of field experience/ internship (experience, responsibilities and supervision) (*format* – I, A, 1, a, etc.) – PLEASE SEE NOTE¹ BELOW:

- I. Genetic paradigm
 - A. Biological foundations
 - B. Genetic algorithms: selection, crossover, mutation
 - C. Fitness functions
 - D. Algorithm analysis
 - E. Application programming problems
- II. Neural networks
 - A. History
 - B. Learning: supervised, unsupervised, reinforced

¹ NOTE: If the omnibus course includes student and/or course instructor research that involves (1) interviewing subjects **and/or** (2) handling personal data **and/or** (3) topics which could be viewed as “sensitive” (e.g., personal political views, health data, sexuality, etc.), **then approval by the Office of Academic and Student Affairs will require assurance that the guidelines described at the end of this document have been followed.**

- C. Feedforward networks, recurrent networks
 - D. Algorithm analysis
 - E. Application programming problems
- III. Emergent systems / swarm intelligence
- A. Ant colonies, flocking
 - B. Algorithm analysis
 - C. Application programming problems

ADA Syllabus Statement

The Metropolitan State University of Denver is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. If you have a disability which may impact your performance, attendance, or grades in this class and are requesting accommodations, then you must first register with the Access Center, located in the Auraria Library, Suite 116, 303-556-8387.

The Access Center is the designated department responsible for coordinating accommodations and services for students with disabilities. Accommodations will not be granted prior to my receipt of your faculty notification letter from the Access Center. Please note that accommodations are never provided retroactively {i.e., prior to the receipt of your faculty notification letter.} Once I am in receipt of your official Access Center faculty notification letter, I would be happy to meet with you to discuss your accommodations. All discussions will remain confidential. Further information is available by visiting the Access center website, msudenver.edu/access/.

Excerpt from

**METROPOLITAN STATE UNIVERSITY OF DENVER
GUIDELINES FOR THE PROTECTION OF HUMAN SUBJECTS**

Available in full on the MSU Denver website:

<http://www.msudenver.edu/irb/gettingstarted/studentresearch/>

This required course content MUST be part of the “Detailed outline of course content” section of the independent study course syllabus OR a statement must be attached that clearly states how the proper procedures have been followed by the course instructor and/or the student.

THE ASSOCIATE VP FOR ACADEMIC AND STUDENT AFFAIRS CANNOT SIGN AN INDEPENDENT STUDY SYLLABUS THAT APPEARS TO INVOLVE HUMAN SUBJECTS AND/OR PERSONAL DATA UNLESS THIS INFORMATION IS PROVIDED.