

## CS 789.001 Genetic Algorithms and Neural Networks

University of Nevada, Las Vegas

Spring 09, call#05936

TR 4:00 - 5:15 pm, BEH 107

**Course Objective** Evolutionary computing has been used in engineering, particularly in optimization, to solve computationally hard problems. With experience, genetic algorithms can be applied as a general purpose method across disciplines. The course introduces the concept of genetic algorithms, shows how and why these algorithms work, and discussed some of the recent software tools such as MIT's GALib.

The course proceeds to include other adaptive methods, such as simulated annealing, tabu search, and neural networks, especially as they relate to genetic algorithms.

### Professor

Dr. Wolfgang W. Bein

Phone: (702) 895-1477

Internet: [bein@cs.unlv.edu](mailto:bein@cs.unlv.edu), <http://www.cs.unlv.edu/~bein/>

Office: TBE B 372 E

Office Hours: Tuesday 2:30 pm - 4:00 pm, Wednesday 4:00 pm - 7:00 pm, Thursday 2:30 pm - 4:00 pm.

### Course Page

<http://www.cs.unlv.edu/~bein/teaching/adaptive/>

### Textbooks

Mitchell, An Introduction to Genetic Algorithms, MIT Press, 1998, ISBN 0-262-63185-7  
Goldberg, Genetic Algorithms, Addison Wesley, 1989, ISBN 0-201-15767-5.

### Examinations and Assignments

**Assignments** : Written home work assignments and programming projects under C++ using gcc and GALib. (count for 40% of the grade).

**Quiz** : Tuesday, February 10, 4:00 pm; (counts for 10% of the grade).

**Midterm 1** : Thursday, Tuesday March 10 4:00 pm; (counts for 15% of the grade).

**Midterm 2** Thursday, April 2, 4:00 am; (counts for 15% of the grade).

**Final Exam** (cumulative, covers all material) : Tuesday, May 5, 6:00 am (counts for 20% of the grade) (cumulative, covers all material).

There are no make-up tests.

## Topics

1. An Overview of Combinatorial Optimization
2. An Introduction to Genetic Algorithms
3. Theoretical Foundations of Genetic Algorithms
4. Genetic Algorithms in Engineering and Optimization
5. Genetic Algorithms in Natural Evolution
6. Simulated Annealing and Tabu Search
7. Artificial Neural Networks
8. Evolving Neural Networks
9. Implementing Genetic Algorithms:

GALib

(optional) Genetic Algorithm Optimization Toolbox (GAOT) under Matlab.

## Other Reading

Aarts (Editor), Lenstra (Editor), Local Search in Combinatorial Optimization, Wiley-Interscience Series in Discrete Mathematics and Optimization. John Wiley & Sons, 1997

Flake, The Computational Beauty of Nature, MIT Press, 1998.

Golden, Mathematical Methods for Neural Network Analysis and Design. MIT Press, 1996

von Neumann, The Computer and the Brain. Yale University Press, 1958

### Summary of Selected UNLV Policies:

**Students Needing Assistance Due To Documented Disability:** Learning Enhancement Services (LES) houses Disability Services, Tutoring Services, and Learning Strategies. If you have a documented disability that may require assistance, you will need to contact LES for coordination in your academic accommodations. LES is located in the Reynolds Student Services Complex, Suite 137. The phone number is 895-0866 or TDD 702-895-0652. You may also visit our website at: <http://www.unlv.edu/studentlife/les>.

**UNLV Policy on Copyright:** The University requires student to familiarize themselves and to follow copyright and fair use requirements. Students are individually and solely responsible for violations of copyright and fair use laws; see <http://www.unlv.edu/committees/copyright>.

**UNLV Policy on Religious Holidays:** Students must notify the professor of anticipated absences due to religious observances by the last day of late registration, 1/27/03, to arrange the opportunity to make up missed work.

**UNLV Policy on Official (UNLV) Extracurricular Activity:** Students who represent UNLV at any official extracurricular activity must provide official written notification to the instructor no less than one week prior to the missed class(es) to have the opportunity to make up missed work.