CS 555.01: Evolutionary Computation and Artificial Life

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CS 555 Evolutionary Computation and Artificial Life

Instructor: Alden Wright, 407 Social Science, 406 243-4790, wright@cs.umt.edu

Meeting times and places: Wednesdays, 11:30 to 12:00 SS 402 and Thursdays, 12:40 to 2:00 SS 344.

Office hours: (tentative) Monday and Friday 2:10-3:00, Tuesday, Thursday 3:10-4:00.
(Since I have many meetings, it would be helpful if you could make an appointment even if you want to see me during my office hours.) In general, I will not be available in the mornings, but will be around afternoons.

Textbook: Modern Heuristics, by Zbignew Michalewicz and David B. Fogel (Springer)

Exams: October 3, November 12, plus the final.

Assignments: You will do 6 assignments. These may be presentations, reports, problem sets, computer programs, or experiments. There will be opportunity to choose what kind of work you do for these assignments. In some cases, an assignment might be a progress report on a larger project.

Grading: 50% for exams and 50% for assignments. The conversion of number grades to letter grades will be: 70-80: C; 80-90: B; 90-100: A. I may change to a more liberal conversion scale if the grades from this scale are too low. Students who want to count this towards a CS program should not sign up for pass-fail.

Incompletes and late drops: I will strictly follow University policy. In for me to consider an incomplete or late drop, you will have to submit documentation (such as a note from a doctor) to verify your reason for the incomplete or late drop.

Collaboration: Collaboration on assignments is OK if you acknowledge and describe the collaboration when you turn in the assignment. You are responsible for writing/typing your own assignments, and you are responsible for understanding what you turn in. Collaboration on exams is not acceptable.

Topics Covered:

- Introduction and History
- Sample Problems, Basic Techniques
- Local Search, Simulated Annealing, Tabu Search
- Tabu Search, Local Search and Simulated Annealing Applied to TSP
- Local Search and Review for the Exam
- Evolutionary computation, selection methods
- Representations
- Representation, Variation operators
- Solving the Traveling Salesman Problem by Evolutionary and other methods
- How do genetic algorithms work? The Schema Theorem
- How do genetic algorithms work? The Building Block Hypothesis
- Genetic Algorithms and Fixed Points
- An Introduction to Genetic Programming
- More on Genetic Programming
• Review for Exam 2
• Theoretical solution to Assignment 4
• Applying genetic programming to circuit synthesis
• Applying genetic programming to bioinformatics
• Bioinformatics part II, Practical considerations
• No-Free-Lunch results
• Review for final