

Course Syllabus

1. **Program of Study** Bachelor of Science (Computer Science)
Faculty/Institute/College Mahidol University International College
 Mahidol University

Course Code ICCS 439 **Course Title** Evolutionary Computation

2. **Number of Credits** **4 (Lectures/lab) (4 - 0)**

3. **Prerequisite(s)** ICCS 321

4. **Type of Course** Elective

5. **Trimester / Academic Year** Trimester III / Year 2005 - 2006

6. **Course Description**

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators; co-evolution; constraint handling techniques; niching and speciation; genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms

7. **Course Objective(s)**

By the end of the course students should be able to:

- Gain understanding of various evolutionary computation techniques
- Identify algorithms suitable for solving certain evolutionary-computation problems
- Apply evolutionary computation techniques to optimization, learning, and design
- Implement at least one algorithm from each of the following groups: generic algorithms, representations, selections, and search operators
- Compare and contrast algorithms in each group mentioned above

8. **Course Outline**

Week	Topic		Instructor
	Lecture	Hour	
1	Introduction, Possible Applications, Pros and Cons	4	Dr. Krittaya Leelawong
2	Principles of Evolutionary Processes and Genetics	4	
3	A History of Evolutionary Computation, Introduction to Evolutionary Algorithms	4	
4	Genetic Algorithms, Evolutional Strategies, Evolutionary Programming	4	
5	Derivative Methods in Genetic Programming, Learning Classifier Systems, Hybrid Methods	4	
6	Introduction to Representations, Binary Strings, Real-Valued Vectors	4	
7	Permutations, Finite-State Representations, Parse Trees	4	
8	Introduction to Selection, Proportional Selection and Sampling Algorithms	4	

Week	Topic		Instructor
	Lecture	Hour	
9	Tournament Selection, Rank-based Selection, Boltzmann Selection	4	Dr. Krittaya Leelawong
10	Generation Gap Methods, A comparison of Selection Mechanisms	4	
11	Introduction to Search Operators, Mutation Operators, Recombination	4	
	Total	44	

9. Teaching Method(s)

Lectures, in-class practical exercises, discussion, and self-study

10. Teaching Media

Text and teaching materials, Powerpoint, Mathematica, and handouts

11. Measurement and Evaluation of Student Achievement

Assessment made from stated criteria: students with 90%+ obtain grade A

12. Course Evaluation

1. Participation	5%	4. Mid-term exam	25%
2. Written assignments (×5)	15%	5. Final exam	35%
3. Programming assignments	20%		

13. Reference(s)

Bäck, T., 2000. Evolutionary Computation 1: Basic Algorithms and Operators. Institute of Physics Publishing, Bristol.

Fogel, D.B., 1999. Evolutionary Computation : Toward a New Philosophy of Machine Intelligence-2nd ed. Wiley-IEEE Press.

Jacob, C., 2001. Illustrating Evolutionary Computation with Mathematica. Morgan Kaufmann.

14. Instructor(s)

Dr. Krittaya Leelawong

15. Course Coordinator

Dr. Krittaya Leelawong