

Course Syllabus

1. **Program of Study** Bachelor of Science (Computer Science)
Faculty/Institute/College Mahidol University International College
Mahidol University
2. **Course Code** ICCS 437 **Course Title** Fundamental of Natural Computation
3. **Number of Credits** **4 (Lectures/lab) (4 - 0)**
4. **Prerequisite(s)** ICCS 325
5. **Type of Course** Elective
6. **Trimester / Academic Year** Trimester I / Year 2005 - 2006
7. **Course Description**
The study of systems inspired by nature, evolutionary computation, neural networks, artificial immune systems; computing simulation and emulation of nature, fractal geometry, artificial life; computing with natural materials, DNA computing; foundations for further advanced study of specific areas (especially neural networks and evolutionary algorithms); implementation of selected algorithms
8. **Course Objective(s)**
By the end of the course students should be able to:
 - Understand the connections of the nature, especially human brains, and computation
 - Describe and explain the key concepts of fitness, search, data, dynamics, optimization, learning, genetic algorithms
 - Compare and contrast natural systems with their corresponding computational techniques

9. Course Outline

Week	Topic		Instructor
	Lecture	Hour	
1	Natural Computation	4	Dr. Krittaya Leelawong
2	Fitness	4	
3	Programs	4	
4	Data	4	
5	Dynamics	4	
6	Optimization	4	
7	Content-Addressable Memory	4	
8	Supervised & Unsupervised Learning	4	
9	Markov Model	4	
10	Reinforcement Learning	4	
11	Genetic Programming, Summary	4	
	Total	44	

10. Teaching Method(s)

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

11. Teaching Media

Text and teaching materials, Powerpoint, and handouts

12. Measurement and Evaluation of Student Achievement

Assessment made from stated criteria: students with 85% obtain grade A

13. Course Evaluation

1. Participation	5%	3. Mid-term exam	30%
2. Written & programming assignments (×5)	25%	4. Final exam	40%

14. Reference(s)

Ballard, D. H., 1999. An Introduction to Natural Computation. MIT Press, Cambridge, MA.

Coello Coello, C. A. et al., 2004. Applications of Multi-Objective Evolutionary Algorithms. World Scientific Publishing Company, Singapore.

15. Instructor(s)

Dr. Krittaya Leelawong

16. Course Coordinator

Dr. Krittaya Leelawong