Tamkang University Academic Year 112, 2nd Semester Course Syllabus

Course Title	METAHEURISTIC COMPUTING	Instructor	CHENG SHIAN LIN
Course Class	TEIEM1A MASTER'S PROGRAM IN INTELLIGENT COMPUTING AND APPLICATION, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG4 Quality education		

Departmental Aim of Education

Ⅰ. Cultivate the ability to conduct independent research and problem solving.

Ⅱ. Strengthen creativity and research capacity.

Ⅲ. Build profound professional knowledge in networking and communication.

Ⅳ. Engage in self-directed lifelong learning.

Subject Departmental core competences

A. Independent problem solving ability.(ratio:20.00)

B. Independent innovative thinking ability.(ratio:20.00)

C. Research paper writing and presentation ability.(ratio:20.00)

D. Research &development (R&D) ability in networking and communication.(ratio:20.00)

E. Project execution and control ability.(ratio:10.00)

F. Lifelong self-directed learning ability.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:20.00)

3. A vision for the future. (ratio:10.00)

4. Moral integrity. (ratio:10.00)

5. Independent thinking. (ratio:20.00)

6. A cheerful attitude and healthy lifestyle. (ratio:10.00)

7. A spirit of teamwork and dedication. (ratio:10.00)

8. A sense of aesthetic appreciation. (ratio:10.00)

Course Introduction	The course is designed for graduate students to enhance the concepts of metaheuristic computing and some optimization techniques derived from metaheuristic computing. In addition, the practical applications of metaheuristic computing will be introduced as well. Finally, students can apply those metaheuristic algorithms to the related research area.

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.

II.Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.

III.Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	To give a concise introduction to metaheuristic computing	Cognitive
2	Discussing the optimization techniques derived from metaheuristic computing	Cognitive
3	Students will survey updated journal papers of related issues and make presentations	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDEF	12345678	Lecture, Discussion	Study Assignments, Discussion(including classroom and online)
2	ABCDEF	12345678	Lecture, Discussion, Publication	Study Assignments, Discussion(including classroom and online)
3	ABCDEF	12345678	Lecture, Discussion	Study Assignments, Discussion(including classroom and online)

Course Schedule

Week	Date	Course Contents	Note

1	113/02/19 ~ 113/02/25	Syllabus and course introduction	
2	113/02/26 ~ 113/03/03	Introduction to Matlab/Python Programming	
3	113/03/04 ~ 113/03/10	Introduction to Numpy/Pandas packages	
4	113/03/11 ~ 113/03/17	Genetic algorithm (GA)	
5	113/03/18 ~ 113/03/24	Genetic algorithm (GA)	
6	113/03/25 ~ 113/03/31	Particle Swarm Optimization (PSO)	
7	113/04/01 ~ 113/04/07	Particle Swarm Optimization (PSO)	
8	113/04/08 ~ 113/04/14	Ant System (AS)	
9	113/04/15 ~ 113/04/21	Ant System (AS)	
10	113/04/22 ~ 113/04/28	Project Proposal	Project Proposal(Explain the final project)
11	113/04/29 ~ 113/05/05	Ant Colony Optimization (ACO)	
12	113/05/06 ~ 113/05/12	Ant Colony Optimization (ACO)	
13	113/05/13 ~ 113/05/19	Case Study	
14	113/05/20 ~ 113/05/26	Case Study	
15	113/05/27 ~ 113/06/02	Case Study	
16	113/06/03 ~ 113/06/09	Final project presentation	
17	113/06/10 ~ 113/06/16	Final project presentation	
18	113/06/17 ~ 113/06/23	Discussion & Summary	

Key capabilities	Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)
Distinctive teaching	Special/Problem-Based(PBL) Courses

Course Content	Computer programming or Computer language (students have hands-on experience in related projects) Logical Thinking
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Presentations
References	1. Eric Bonabeau, Marco Dorigo, and Guy Theraulaz, Swarm Intelligence: From Natural to Artificial Systems, Oxford University Press, 1999; 2. Marco Dorigo and Thomas Stutzle, Ant Colony Optimization, The MIT Press, 2004.; 3. A. P. Engelbrecht, Fundamentals of Computational Swarm Intelligence, John Wiley & Sons, Ltd. 2005.; 4. Related Journal papers
Grading Policy	◆ Attendance： 30.0 % ◆ Mark of Usual：35.0 % ◆ Midterm Exam： % ◆ Final Exam： % ◆ Other〈Final Report〉：35.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . **※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**