Tamkang University Academic Year 111, 2nd Semester Course Syllabus

Course Title	SWARM INTELLIGENCE	Instructor	CHENG SHIAN LIN
Course Class	TEIEM1A MASTER'S PROGRAM IN INTELLIGENT COMPUTING AND APPLICATION, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION	Details	◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	ENGINEERING, 1A 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:10.00)

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

E. Project execution and control ability.(ratio:20.00)

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 swarm intelligence (SI) and some optimization techniques derived from SI. In addition, the practical applications of SI will be introduced as well. Finally, students can apply those SI 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 swarm intelligence (SI)	Cognitive
2	Discussing the optimization techniques derived from swarm intelligence (SI)	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	A	5	Lecture, Discussion, Publication	Study Assignments, Discussion(including classroom and online)
3	A	5	Lecture, Discussion	Study Assignments, Discussion(including classroom and online)

Course Schedule

Week	Date	Course Contents	Note

1	112/02/13 ~ 112/02/19	Syllabus and course introduction	
2	112/02/20 ~ 112/02/26	Introduction to Matlab/Python Programming	
3	112/02/27 ~ 112/03/05	Introduction to Numpy package	
4	112/03/06 ~ 112/03/12	Introduction to Pandas package	
5	112/03/13 ~ 112/03/19	Introduction to swarm intelligence (SI)	
6	112/03/20 ~ 112/03/26	Particle Swarm Optimization (PSO)	
7	112/03/27 ~ 112/04/02	Particle Swarm Optimization (PSO)	
8	112/04/03 ~ 112/04/09	Ant System (AS)	
9	112/04/10 ~ 112/04/16	Ant System (AS)	
10	112/04/17 ~ 112/04/23	Project Proposal	Project Proposal(Explain the final project)
11	112/04/24 ~ 112/04/30	Ant Colony Optimization (ACO)	
12	112/05/01 ~ 112/05/07	Ant Colony Optimization (ACO)	
13	112/05/08 ~ 112/05/14	Case Study	
14	112/05/15 ~ 112/05/21	Case Study	
15	112/05/22 ~ 112/05/28	Case Study	
16	112/05/29 ~ 112/06/04	Final project presentation	
17	112/06/05 ~ 112/06/11	Final project presentation	
18	112/06/12 ~ 112/06/18	Discussion & Summary	

Requirement	
Teaching Facility	Computer, Projector
Textbooks and Teaching Materials	Self compiling teaching material
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

Number of Assignment(s)	(Filled in by assignment instructor only)
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.**