Tamkang University Academic Year 102, 2nd Semester Course Syllabus

Course Title	IMAGE PROCESSING	Instructor	YEN SHWU-HUEY
Course Class	TEIXD1A DOCTORAL PROGRAM, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION ENGINEERING, 1A	Details	◆ Selective ◆ One Semester ◆ 3 Credits

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 computer science and information engineering.

Ⅳ. Engage in self-directed lifelong learning.

Departmental core competences

A. Independent problem solving ability.

B. Independent innovative thinking ability.

C. Research paper writing and presentation ability.

D. Research&development (R&D) ability in information engineering.

E. Project execution and control ability.

F. Lifelong self-directed learning ability.

Course Introduction	The principle objectives of this course is to provide an introduction to basic concepts and methodologies for computer vision, and to develop a foundation that can be used as the basis for further study and research in this field.

The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :
 (i) Cognitive Domain : C1-Remembering,   C2-Understanding,   C3-Applying,
                         C4-Analyzing,   C5-Evaluating,   C6-Creating
 (ii) Psychomotor Domain : P1-Imitation,   P2-Mechanism,   P3-Independent Operation,
                         P4-Linked Operation, P5-Automation,   P6-Origination
 (iii) Affective Domain : A1-Receiving,   A2-Responding,   A3-Valuing,
                         A4-Organizing,   A5-Charaterizing,   A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :
 (i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.
 (ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)
 (iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	1. Students will learn basic definitions and operations on image processing	C4	AB
2	2. Students will learn how to apply various image processing techniques on computer vision	C4	ABD
3	3. Students will learn how to program related algorithms and problem solving.	C6	ABDE
4	4. Students will survey updated journal papers of related issues and make presentations	C5	ABCF
5	5. Students will learn how to comment pro and con of academic papers	C5	ABCF

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	1. Students will learn basic definitions and operations on image processing	Lecture, Discussion	Participation
2	2. Students will learn how to apply various image processing techniques on computer vision	Lecture, Discussion, Problem solving	Participation, program
3	3. Students will learn how to program related algorithms and problem solving.	Lecture, Discussion, Problem solving	Participation, Project

4	4. Students will survey updated journal papers of related issues and make presentations	Discussion	Report, Participation, presentati
5	5. Students will learn how to comment pro and con of academic papers	Discussion	Report, Participation, presentati

This course has been designed to cultivate the following essential qualities in TKU students	
Essential Qualities of TKU Students	**Description**
◆ A global perspective	Helping students develop a broader perspective from which to understand international affairs and global development.
◇ Information literacy	Becoming adept at using information technology and learning the proper way to process information.
◇ A vision for the future	Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.
◇ Moral integrity	Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.
◆ Independent thinking	Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.
◇ A cheerful attitude and healthy lifestyle	Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.
◆ A spirit of teamwork and dedication	Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.
◇ A sense of aesthetic appreciation	Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.

Course Schedule			
Week	Date	Subject/Topics	Note
1	103/02/17 ~ 103/02/23	OpenCV Introduction	
2	103/02/24 ~ 103/03/02	Basic Image Processing Algorithms	
3	103/03/03 ~ 103/03/09	Feature detection and matching- I	
4	103/03/10 ~ 103/03/16	Feature detection and matching- II	
5	103/03/17 ~ 103/03/23	Segmentation I	
6	103/03/24 ~ 103/03/30	Segmentation II	
7	103/03/31 ~ 103/04/06	no class	
8	103/04/07 ~ 103/04/13	Feature-based alignment I	

9	103/04/14~103/04/20	Feature-based alignment II	
10	103/04/21~103/04/27	Midterm Exam Week	
11	103/04/28~103/05/04	Camera Models and Calibration	
12	103/05/05~103/05/11	Projection and 3D vision	
13	103/05/12~103/05/18	Talk Participation for The Week of CSIE Activity	CSIE WK
14	103/05/19~103/05/25	Image stitching	
15	103/05/26~103/06/01	Student Presentations- I	
16	103/06/02~103/06/08	Student Presentations- II	
17	103/06/09~103/06/15	Student Presentations- III & Project demo	
18	103/06/16~103/06/22	(final exam week) Project demo	

Requirement	Programming experiences
Teaching Facility	Computer, Projector
Textbook(s)	Download the most recent academic papers for survey and presentation Computer Vision: Algorithms and Applications" by Richard Szeliski (2010)
Reference(s)	
Number of Assignment(s)	3 (Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 15.0 ％ ◆ Mark of Usual：25.0 ％ ◆ Midterm Exam： ％ ◆ Final Exam： ％ ◆ Other〈term project & progr〉：60.0 ％
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.**