Tamkang University Academic Year 103, 2nd Semester Course Syllabus

Course Title	COMPUTER VISION	Instructor	CHING-TING TU
Course Class	TEIBM1A ENGLISH MASTER'S 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	This course is to introduce principles and methods of obtaining information from images and videos. Topics include image features, image processing, shape analysis, image matching, 3D reconstruction, human pose and action, and modern image database and retrieval, etc.

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	To be able to compute scene and camera properties from real world images using state-of-the-art algorithms.	C3	A
2	Modern Image Processing Techniques	C4	A
3	Computer Vision and Recognition	P4	A

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	To be able to compute scene and camera properties from real world images using state-of-the-art algorithms.	Lecture, Discussion	Practicum, Report, Participation
2	Modern Image Processing Techniques	Lecture, Discussion	Practicum, Report, Participation
3	Computer Vision and Recognition	Lecture, Discussion	Practicum, Report, Participation

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	104/02/24 ~ 104/03/01	Introduction	
2	104/03/02 ~ 104/03/08	Image Understanding	
3	104/03/09 ~ 104/03/15	Image Formation：□ Sensor: Camera Model (I)	
4	104/03/16 ~ 104/03/22	Image Formation：□ Sensor: Camera Model (II)	
5	104/03/23 ~ 104/03/29	Image Formation：□ Filtering	
6	104/03/30 ~ 104/04/05	Image Features:□ Feature Detection	
7	104/04/06 ~ 104/04/12	Image Features:□ SIFT Feature	
8	104/04/13 ~ 104/04/19	Image Features:□ Feature Matching	
9	104/04/20 ~ 104/04/26	Algorithm Evaluation and Error Analysis	
10	104/04/27 ~ 104/05/03	Computation of the Camera Matrix P	
11	104/05/04 ~ 104/05/10	More Single View Geometry	
12	104/05/11 ~ 104/05/17	資訊週	

13	104/05/18～ 104/05/24	3D Reconstruction of Cameras and Structure（Ⅰ）	
14	104/05/25～ 104/05/31	3D Reconstruction of Cameras and Structure（Ⅱ）	
15	104/06/01～ 104/06/07	3D Reconstruction of Cameras and Structure（Ⅲ）	
16	104/06/08～ 104/06/14	Computation of the Fundamental Matrix F	
17	104/06/15～ 104/06/21	Structure Computation（Ⅰ）	
18	104/06/22～ 104/06/28	Structure Computation（Ⅱ）	

Requirement	
Teaching Facility	Computer, Projector
Textbook(s)	
Reference(s)	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 50.0 % ◆ Mark of Usual： % ◆ Midterm Exam： % ◆ Final Exam： % ◆ Other〈Project〉：50.0 %
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.**