

National Taiwan Normal University Online Course Teaching Plan

Instructions: According to **Article 6 of the Implementation Regulations Regarding Distance Learning by Universities**, Departments/Programs offering distance learning courses, shall present a course plan and submit it for approval by the university-level academic affairs committee. The course plan referred to in the preceding paragraph shall set forth learning objectives, the target student group, a course outline, teaching methods, interactive student-teacher discussion, grading and course requirements. The course plan shall be posted on the Internet.

1. **Chinese Course Name:** 電腦視覺
2. **English Course Name:** Computer Vision
3. **Course start date:** Fall semester of 2026
4. **Course review submission record**(☒ if applicable):

☒ (1) It is a new online course or an existing face-to-face course switching to online course in this semester
(University's Course Committee approval in the Spring semester of 2026)

☐ (2) It is an existing online course; the latest University's Course Committee approval was in the ____ semester of ____ (academic year)

☐ (2. 1) The 5-year validity period has expired; a new application is required.

☐ (2. 2) In case of a major change in the original approved course or if the revision ratio exceeds 30%, reapplication is required.

5. Basic Course Information (☒ if applicable)

(1)	Instructor Name & Title	Jhih-Ciang Wu, Assistant Professor/吳志強助理教授
(2)	Instructor Sources	☒ Appointed by Departments ☐ Appointed by General Education Center ☐ Both of Above ☐ Others:
(3)	College/Department/Center	Department of Computer Science and Information Engineering
(4)	School System	☐ Undergraduate Program ☐ Master's Program ☐ BA/MA Joint Course ☒ MA/PhD Joint Course ☐ PhD Program ☐ Continuing Education Master's Program
(5)	Program Type	☒ Full-time Program ☐ Part-time Program ☐ Others:
(6)	Course Type	☐ Common Courses ☐ General Courses ☐ School Required Courses ☒ Professional Courses ☐ Educational Courses ☐ Other:
(7)	Required Courses	☐ University-required ☐ College-required ☐ Graduate Institute-required ☒ Department-required ☐ Others:
(8)	Course Duration	☒ One Semester (half year) ☐ Two Semesters (one year) ☐ Others:
(9)	Required/Elective Course	☐ Required ☒ Elective ☐ Others:
(10)	Course Credits	3

(11)	Average of Face-to-Face Teaching Hours Per Week	1.125 hour(s)/week (Divide the total "face-to-face teaching" hours, including the hours of face-to-face teaching and synchronous teaching, by the total number of course weeks.)
(12)	Number of Classes	1
(13)	Estimated Total Number of Students	50
(14)	EMI Courses	☒ Yes ☐ No
(15)	Type of Cooperation with Domestic/Foreign Universities (omit if inapplicable)	1. Cooperative University: _____; Department/Institute: _____ Instructor Name: _____; Course Name: _____; Number of Students: _____ 2. ☐ Partner University ☐ Dual-Degree Program ☐ Global Virtual Classroom Course ☐ Others: _____
(16)	Course Platform Website (asynchronous teaching is required)	NTNU online learning platform: https://moodle.ntnu.edu.tw/
(17)	Syllabus Website	http://courseap.itc.ntnu.edu.tw/acadmOpenCourse/index.jsp

6. Course Teaching Design and Implementation Method

(1)	Course Goals	This course covers traditional computer vision techniques. The first half of the course will focus on foundational theory, while the second half will be more problem-oriented, encouraging students to engage in related research projects.						
(2)	Target Student Group	Students themselves are a target group for learning and research projects, engaging in hands-on projects involving feature detection, object recognition, and model deployment to build practical skills.						
(3)	Prerequisite(s)	Calculus, Linear Algebra, Proficiency in Python						
(4)	Course Content Outline:							
	Week	Topics (If there are multiple instructors, please specify instructor names in each week)	Learning Objectives (From the perspective of students)	Teaching Interactive Design (Multiple choices allowed)	Testing/Evaluation Activities (Multiple choices allowed. Choose “None” if not designed for the week.)	Teaching Method and Hours (fill-in the number of hours, omit if none)		
						Face-to-Face Teaching	Distance learning	
							Synchr onous	Asynchr onous
	1	Introduction Course logistics	Understand the definition and scope of computer vision.	☒ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____	3		

				☐ None			
2	Image formation	Visit the basic geometric primitives used throughout the book (points, lines, and planes) and the geometric transformations.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____			3
3	Image processing	Learn standard image processing operators that map pixel values from one image to another.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____			3
4	Optimization and learning	Understand some easy-to-use techniques, such as triangulation, spline interpolation, and radial basis functions.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____			3
5	Introduction to Deep learning	- Understand deep neural networks, including weights and activations, regularization terms. - Implement model training using backpropagation and stochastic gradient descents.	☒ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____		3	
6	Recognition	Understand image classification, object detection, and semantic segmentation.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others:_____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others:_____			3

		7	Feature detection and matching	Familiarize practical approaches to detecting such features and also how feature correspondences can be established across different images.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3	
		8	Midterm	Enhance understanding of the course content from weeks 1 to 7.	☐ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None	3			
		9	Image alignment and stitching	Understand geometric image registration, i.e., the computation of 2D and 3D transformations that map features in one image to another.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3	
		10	Motion estimation	Learn how to estimate the motion between two or more images.	☒ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None		3		
		11	Computational photography	Understand photometric image calibration and dynamic range imaging.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3	
		12	Structure from motion	Understand commonly used techniques for calibrating the camera intrinsics.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3	

		13	Depth estimation	Understand fundamental principles behind stereo matching.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3
		14	3D reconstruction	Understand 3D shape acquisition and modeling techniques.	☒ Topic discussion ☐ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None			3
		15	Image-based rendering	Understand a variety of image-based rendering techniques such as view interpolation and view-dependent texture maps.	☒ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☒ Assignments ☐ _____ exam ☐ _____ report ☐ Others: _____ ☐ None		3	
		16	Final	Enhance understanding of the course content from weeks 9 to 15.	☐ Topic discussion ☒ Group discussion ☐ Peer review ☐ Instructor feedback ☐ Others: _____	☐ Tests ☐ Assignments ☐ _____ exam ☒ Individual report ☐ Others: _____ ☐ None	3		
(5)	Teaching Methods	(☒ if included; multiple choices allowed) ☒ 1. Provide primary and supplementary materials for online courses ☒ 2. Provide face-to-face teaching, number: <u>3</u> time(s), total hour(s): <u>9</u> hour(s) ☒ 3. Provide synchronous teaching, number: <u>3</u> time(s), total hour(s): <u>9</u> hour(s) ☒ 4. Provide asynchronous teaching, number: <u>10</u> time(s), total hour(s): <u>30</u> hour(s) ☒ 5. Provide topic discussion activities ☒ 6. Provide cooperative learning activities between students ☒ 7. Mutual learning through students' works ☐ 8. Others: (please specify)							
(6)	Learning Management	Which moodle functions are used in this course? (☒ if included; multiple choices allowed) Note: For teachers and students from domestic or foreign universities who are participating in joint programs that							

	System (moodle)	require access to Moodle, please have the course instructor contact the platform manager at extensions 5673 or 5579. E-mail: ellearn@ntnu.edu.tw ☒ 1. Personal data ☒ 2. Course information ☒ 3. Latest News release & browse ☒ 4. Course materials viewing & download ☒ 5. Grade system management & inquiry (omit if inapplicable) ☐ 6. Perform online testing (omit if inapplicable) ☒ 7. Learning information ☒ 8. Interactive learning design (chat room or discussion area) ☐ 9. Other related functions: (please specify)
(7)	Public Information about Interactive Teaching	Instructor Profile and Published Works (webpage link instructions can be attached): https://jhih-ciang.github.io/publications/
		Instructor E-mail: jcwu@csie.ntnu.edu.tw
		Online Office Hours (at least 1 hour per week): AM 9:00 – AM 11:00, Monday.
		Teaching Assistant's Name/E-mail (omit if inapplicable):
		Others(omit if inapplicable):
(8)	Course Material Production	(☒ if included; multiple choices allowed) ☒ 1. Provide appropriate reminders of key points ☒ 2. Provide teaching-related examples ☒ 3. Provide teaching-related exercises and reflective activities ☒ 4. Provide supplementary teaching materials or online resources ☒ 5. Provide instructions for self-directed learning ☒ 6. Learning objectives are consistent with course goals ☐ 7. Others:
(9)	Assignment Submission Method	(☒ if included; multiple choices allowed) ☒ 1. Provide online assignment content description ☒ 2. Assignment file upload and download ☐ 3. Others:
(10)	Assessment	※ To comply with the spirit of online course design, please understand and agree to the contents of the following

		3 items, and provide detailed description: ■ 1. The course can provide evaluation results and feedback for each learning evaluation ■ 2. The evaluation has taken the students online learning history and participation level into account ■ 3. The percentage of each score is explained in detail below: (Evaluation methods, and their total score percentage) (1) Assignments 70% (2) Final report 30%
(11)	Precautions for Class:	1. Follow the schedule for learning and attend synchronous online sessions 2. Submit course assignments punctually.
(12)	<u>Observe intellectual property rights in the creation of course content.</u> ※ Pay attention to any infringement of copyright or other rights in the creation of relevant teaching content. ※ If the copyright for any part of the teaching content is owned by others and authorization has been obtained from the rights holder, please indicate the source of the material.	