課程資訊 (Course Information)					
科號 Course Number	11210CS 655000	學分 Credit	3	人數限制 Class Size	60
中文名稱 Course Title	計算機視覺理論				
英文名稱 Course English Title	Computer Vision				
任課教師 Instructor	賴尚宏(LAI, SHANG-HONG) *more information*				
上課時間 Time	T7T8R7	上課教室 Room	DELTA台達108		

提醒您：請遵守智慧財產權，勿使用非法影印教科書
Please respect the intellectual property rights, do not use illegal copies of textbooks.

此科目對應之系所課程規畫所欲培養之核心能力 Core capability to be cultivated by this course	■ 具有活用資訊、數學及科學知識的能力。(20%) To have the ability to apply knowledge of computer science, mathematics, and science to daily life. (20%) ■ 具有創新及批判性思考，能發現、定義、及解決問題的能力。(10%) To be able to think creatively and critically as well as discover, define, and solve problems. (10%) ■ 具有分析、設計、開發、整合、測試、與評估資訊系統、元件、或演算法的能力。(15%) To be able to analyze, design, develop, integrate, test, and evaluate systems, components, and algorithms of computer science. (15%) ■ 具備良好的溝通技巧與跨領域團隊合作的能力。(10%) To have good communication skills and be able to cooperate with others in interdisciplinary teams. (10%) ■ 具備檢索文獻、閱讀論文、與撰寫論文的能力。(10%) To be able to search literatures, read and write academic papers. (10%) ■ 具有策劃及執行研究計畫、撰寫研究報告及簡報研究成果的能力。(10%) To be able to plan and execute research projects, write research reports, and present research results. (10%) ■ 能分析評估與資訊相關之產業脈動與最新的資訊科技進展。(10%) To be able to analyze and evaluate the most recent technological and industrial advancements regarding computer science. (10%) ■ 瞭解資訊科技對於全球性社會、經濟、文化等層面的影響與責任。(5%) To understand the social, economical, cultural effects of computer science and related technologies on the global level. (5%) ■ 瞭解國際視野及終身學習的重要性。(5%) To understand the importance of international view as well as lifelong education. (5%) ■ 尊重學術、工程倫理、及智慧財產權。(5%) To respect academics, engineering ethics, and intellectual property. (5%)

課程簡述 (Brief course description)

This course is to give an introductory background in computer vision for senior undergraduate students and graduate students. It will cover the following main topics: image formation, feature extraction, texture, multi-view geometry, camera calibration, 3D geometry reconstruction, image motion analysis, image segmentation, ob<x>ject detection, image classification, deep learning and related applications.

課程大綱 (Syllabus)

Course keywords:
computer vision, pattern recognition, machine learning, image processing, deep learning

一、課程說明(Course Description)
This course is to give an introductory background in computer vision for senior undergraduate students and graduate students. It will cover the following main topics: image formation, feature extraction, texture, multi-view geometry, camera calibration, 3D geometry reconstruction, image motion analysis, image segmentation, object detection, object recognition, deep learning and related applications.

二、指定用書(Text Books)

Lecture slides distributed in class

三、參考書籍(References)

R. Szeliski, Computer Vision: Algorithms and Applications, 2nd Ed., 2022.
(http://szeliski.org/Book/)

四、教學方式(Teaching Method)

Oral presentation and class discussion

五、教學進度(Syllabus)

1. Image Formation (1 week)
2. Image Features (1 week)
3. Camera Calibration (1 week)
4. Stereo Reconstruction (1 week)
5. Multi-view Reconstruction (1 week)
6. Image Alignment (1 week)
7. Motion and Tracking (1 week)
8. Image Segmentation (1 week)
9. object Recognition (1 week)
10. Deep Learning (2 weeks)
11. object Detection (1 week)
12. object Tracking/Action Recognition (1 week)
13. Face Recognition (1 week)
14. Final Project presentation (1 week)

六、成績考核(Evaluation)

Midterm exam. 25%
Final project. 25%
Homeworks 40%
Class Participation 5%
Class attendance 5%

七、可連結之網頁位址

http://cv.cs.nthu.edu.tw/courses.php