研究所課程綱要表 Graduate degree - Course Syllabus

課程名稱 Course Name：（中文 CH）無人機通訊 Course Title:（英文 EN）UAV Communications				開課系所 Department	Communications Engineering
				課程代碼 Course code	4305190
授課教師 Professor：Chuan-Chi Lai					
學分數 Credits	3	必/選修 Req/Elec	選修 Elec	開課年級 Grade	Graduate students
先修科目或先備能力 Prerequisite：Principles of Communications, Introduction to Digital Communications					
課程概述：Course Overview: This course introduces the UAV paradigm, from 5G and beyond communication perspective, which currently has attracted plenty of attentions from both academia and industrial sides.					
學習目標：Learning Objective: 1. Understand the Overview of 5G and Beyond Communications 2. Understand the Basic Theoretical Background 3. Understand the UAV Assisted Cellular Communications 4. Understand the Cellular Assisted UAV Sensing					
教科書 Textbooks[1]	Hongliang Zhang, Lingyang Song, and Zhu Han, Unmanned Aerial Vehicle Applications over Cellular Networks for 5G and Beyond, Springer, 2020.				

課程綱要 Syllabus		對應之學生核心能力 Student Competencies	備註 Comments
單元主題 Topic	內容綱要 Content Summary		
1. Overview of 5G and Beyond Communications	1.1 Background and Requirements 1.2 UAV Applications 1.3 Current State-of-the-art	1.1, 4.4	
2. Basic Theoretical Background	2.1 Brief Introductions to Optimization Theory 2.2 Basics of Game Theory 2.3 Related Machine Learning Technologies	1.1, 4.4	
3. UAV Assisted Cellular Communications	3.1 UAVs Serving as Base Stations 3.2 UAVs Serving as Relays	1.1, 4.4	
4. Cellular Assisted UAV Sensing	4.1 Cellular Internet of UAVs 4.2 Cooperative Cellular Internet of UAVs 4.3 UAV-to-X Communications 4.4 Reinforcement Learning for the Cellular Internet of UAVs 4.5 Applications of the Cellular Internet of UAVs	1.1, 4.4	

教學要點概述[2]：Grading Standards：

教材編選 Textbook：☑自編教材 Own teaching material　□教科書作者提供 Authored Textbooks

教學方法 Teaching Method：

☑投影片講述 PPT　□板書講述 Blackboard　□實例示範 Demonstration by examples

□操作練習 Activities

評量方法 Grading Method：☑上課點名 Final Presentation（10%）　□小考 Quiz（%）

☑作業 Homework（30%）　□程式實作 Program implementation（%）

□實習報告 Internship report（%）　□專案 project（%）　☑期中考 Mid-term exam（30%）

□期末考 Final exam（%）　☑期末報告 Final report（30%）　□其它 Other（%）

教學資源 Teaching Resources：□課程網站 Course Website

☑教材電子檔供下載 Teaching Material Downloads　□其他 Other _____

教學相關配合事項 Other matters related：None.

核心能力 Core Capabilities

●1.1 ○1.2 ○1.3 ○2.1 ○2.2 ○3.1 ○3.2 ○4.1 ○4.2 ○4.3 ●4.4

1.1 學習電機／通訊工程相關領域之理論基礎(Learning the theoretical basis of EE/COMM related fields)

為何有關(Why is the course capable of cultivating this ability?)：This course introduces issues related to drone communications, therefore it is related to the theoretical foundations of the field of communications engineering.

達成指標(Indicators to be reached)：Gain a thorough understanding of the course materials.

評量方法(Assessment methods)：Assignments, midterm exam, and final report.

1.2 瞭解電機／通訊工程相關領域之實務技術(Studying the substantive technologies of EE/COMM related fields)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

1.3 訓練專業論文寫作與簡報的能力(Practice writing thesis and professional papers)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

2.1 培養發掘與分析電機／通訊工程特定領域專題研究之能力(Cultivating the ability to explore and analyze case studies of specific areas in EE/COMM)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

2.2 培養規劃與執行電機／通訊工程特定領域專題研究之能力(Cultivating the capacity of planning and implementation of Case studies of specific areas in EE/COMM)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

3.1 學習溝通與表達的能力 (Practice communication and self-expression)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

3.2 運用個人專長，與團隊成員合作達成計畫目標 (Collaboration with others)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

4.1 瞭解國內外電機／通訊工程特定領域產業現況與需求 (Understand local and international EE/COMM industry and demands)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

4.2 理解工程倫理及社會責任(Understanding engineering ethics and social responsibility)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

4.3 培養良好的國際觀 (Develop international outlook)

為何有關(Why is the course capable of cultivating this ability?)：

達成指標(Indicators to be reached)：

評量方法(Assessment methods)：

4.4 培養特定領域專業科技英文能力 (Develop the professional field English ability)

為何有關(Why is the course capable of cultivating this ability?)：All course materials are written in technical English.

達成指標(Indicators to be reached)：Gain a thorough understanding of the course materials.

評量方法(Assessment methods)：Assignments, midterm exam, and final report.

註：1. 教科書請註明書名、作者、出版社、出版年等資訊。

2. 教學要點概述請填寫教材編選、教學方法、評量方法、教學資源、教學相關配合事項等。
Include teaching materials, teaching method, assessment method, teaching resources, related matters

3. 研究所所有開設之課程，皆須填寫此表格或提供原有格式之課程綱要表。