中正大學 資訊工程研究所 課程大綱

課程名稱(中文) (Chinese Course type)	無線網路	開課單位 (Department)	資訊工程研究所
課程名稱(英文) (English Course name)	Wireless Networks	課程代碼 (Course code)	4105421
上課時間	二 G, 四 G	上課地點	工學院 A 館 205
授課教師 (Instructor)	王志航	學分數 (Credits)	3
授課語言 (Language)	英文	限修人數 (Capacity)	20
必/選修 (Required/Selected)	☐ 必修 ☑ 選修	開課年級 (Level)	碩博合開，開放大三大四選修
課程屬性/類別 (Course type)	☐ 人文關懷課程 ☐ 競賽專題課程 ☐ 問題導向課程 ☐ 專題導向課程 ☐ 總整課程 ☐ 實作課程 ☐ 實習 ☑ 其他		
先修科目或先備能力 (Prerequisites)	Understand probability theory		
課程概述 (Course Descriptions)	This course provides a comprehensive study of wireless data and communication networks regarding theories, technologies, and applications. Topics include mobile radio propagation, channel coding and error control, cellular concept, multiple radio access, multiple division techniques, channel allocation, and the basics and advancements of 4G/5G/6G.		
學習目標 (Learning Objectives)	1. Understanding the PHY and MAC layers of wireless networks Understanding the latest trends and technologies of 4G/5G/6G wireless networks		
教科書 (Textbooks and Reference)	1. Agrawal, D. P., Zeng, Q. (2015). Introduction to Wireless and Mobile Systems. 美國: Cengage Learning. 請尊重智慧財產權，不得非法影印教師指定之教科書籍 (Please respect to the intellectual property rights, do not photocopy the textbooks which assigned by professors.)		

課程大綱(Course Syllabus)		分配時數 (Number of Hours)	核心能力 (Core Capabilities)	備註 (Remarks)
單元 主題 (Topic)	內容綱要(Content)	講授(Lecture)		
Introduction to wireless networks	History and current states of wireless networks	3	■1 ■2 □3 □4 □5 □6 □7 □8	
Mobile radio propagation	Propagation mechanisms, path loss, fading, Doppler effect, delay spread, intersymbol interference, cochannel interference	3	■1 ■2 □3 □4 □5 □6 □7 □8	
Channel coding and error control	Linear block codes, cyclic codes, CRC, convolutional codes, ARQ	6	■1 ■2 □3 □4 □5 □6 □7 □8	
Cellular concept	Signal strength and cell parameters, frequency reuse, cochannel interference, handoff, cell splitting, cell sectoring	3	■1 ■2 □3 □4 □5 □6 □7 □8	
Multiple radio access	Radio access protocols, contention-based protocols	3	■1 ■2 □3 □4 □5 □6 □7 □8	
Multiple division techniques for traffic channels	FDMA, TDMA, CDMA, OFDM, SDMA, modulation techniques	3	■1 ■2 □3 □4 □5 □6 □7 □8	

Traffic channel allocation	Static, dynamic, and hybrid allocation	3	■1 ■2 □3 □4 □5 □6 □7 □8	
Ad hoc networks	Table-driven routing protocols, source-initiated on-demand routing, hybrid protocols, multipath routing protocols	6	■1 ■2 □3 □4 □5 □6 □7 □8	
4G/5G/6G wireless networks	State-of-the-art research topics of 4G/5G/6G wireless networks	3	■1 ■2 □3 □4 □5 ■6 □7 □8	
Paper presentation	Survey and present state-of-the-art research papers	9	□1 □2 ■3 □4 □5 ■6 □7 ■8	

教育目標

1. 具獨立從事學術研究或產品創新研發之人才
2. 具團隊合作精神及科技整合能力，並在團隊中扮演領導、規劃、管理之角色
3. 具創新研發、自我挑戰與終身學習能力之人才
4. 具有學術倫理、工程倫理、國際觀之人才

核心能力

1. 具有資訊工程與科學領域之專業知識(Competence in computer science and computer engineering.)
2. 具有創新思考、問題解決、獨立研究之能力(Be creative and be able to solve problems and to perform independent research.)
3. 具有撰寫中英文專業論文及簡報之能力(Demonstrate good written, oral, and communication skills, in both Chinese and English.)
4. 具策劃及執行專題研究之能力(Be able to plan and execute projects.)

5. 具有溝通、協調、整合及進行跨領域團隊合作之能力(Have communication, coordination, integration skills and teamwork in multi-disciplinary settings.)
6. 具有終身學習與因應資訊科技快速變遷之能力(Recognize the need for, and have the ability to engage in independent and life-long learning.)
7. 認識並遵循學術與工程倫理(Understand and commit to academic and professional ethics.)
8. 具國際觀及科技前瞻視野(Have international view and vision of future technology.)

教學要點概述			
教材編選 (Teaching Materials)	☑自製簡報(ppt) ☐教學程式	☐課程講義 ☐自製教學影片	☐自編教科書 ☐其他
教學方法 (Teaching Methods)	☑講述 ☐問題導向學習	☐小組討論 ☐個案研究	☑學生口頭報告 ☐其他
評量工具 (Evaluation Tools)	☐上課點名 0.00% ☐程式實作 0% ☑期末報告 30% ☐期末考 0%	☐隨堂測驗 0.00% ☐實習報告 0% ☐專題報告 0.00% ☐評量尺規 0%	☑隨堂作業 30% ☐期中報告 0% ☑期中考 40% ☐其他 0%
教學資源 (Teaching Resources)	☑課程網站	☑教材電子檔供下載	☐實習網站
教師 相關訊息 (Instructor’s Information)	課程進度會依實際教學狀況做調整		
教學相關配合事項 (Course relative information)			

課程目標與教育核心能力相關性	
請勾選：☑ 1☑ 2☑ 3☐ 4☐ 5☑ 6☐ 7☑ 8	
1	**具有資訊工程與科學領域之專業知識**(Competence in computer science and computer engineering)
	為何有關： Wireless networks are a critical research field in computer science, and this course provides a comprehensive understanding of their related theories and technologies.
	達成指標： Students will acquire a thorough understanding of wireless data and communication networks.
	評量方法： Assignments, exams, and paper presentations and discussions. Lv5: this course's grade is above 85; Lv4: this course's grade is above 80; Lv3: this course's grade is above 75; Lv2: this course's grade is above 70; Lv1: this course's grade is below 70.
2	**具有創新思考、問題解決、獨立研究之能力**(Be creative and be able to solve problems and to perform independent research)
	為何有關： This course discusses the most recent and complex challenges in wireless networks and emphasizes critical thinking in the context of relevant research papers.
	達成指標： Students will be able to provide their own perspectives and solutions on research topics, as well as conduct surveys that are pertinent to the subject matter.
	評量方法： Assignments, exams, and paper presentations and discussions. Lv5: this course's grade is above 85; Lv4: this course's grade is above 80; Lv3: this course's grade is above 75; Lv2: this course's grade is above 70; Lv1: this course's grade is below 70.
3	**具有撰寫中英文專業論文及簡報之能力**(Demonstrate good written, oral, and communication skills, in both Chinese and English)
	為何有關: In this course, we conduct paper presentation sessions during which each student is obligated to present a technical paper.
	達成指標：Students will be able to effectively communicate the objective, challenging issues, problem, and solution of technical papers.
	評量方法：Paper presentations and discussions. Lv5: this course's grade is above 85; Lv4: this course's grade is above 80; Lv3: this course's grade is above 75; Lv2: this course's grade is above 70; Lv1: this course's grade is below 70.

4	**具策劃及執行專題研究之能力**(Be able to plan and execute projects.)
	為何有關：
	達成指標：
	評量方法：
5	**具有溝通、協調、整合及進行跨領域團隊合作之能力**(Have communication, coordination, integration skills and teamwork in multi-disciplinary settings.)
	為何有關：
	達成指標：
	評量方法：
6	**具有終身學習與因應資訊科技快速變遷之能力**(Recognize the need for, and have the ability to engage in independent and life-long learning)
	為何有關： This course explores the cutting-edge trends and technologies in wireless networks, drawing upon the latest research from leading conferences and journals.
	達成指標： Students will be able to conduct paper surveys and learn from papers that are pertinent to their research interests.
	評量方法： Paper presentations and discussions. Lv5: this course's grade is above 85; Lv4: this course's grade is above 80; Lv3: this course's grade is above 75; Lv2: this course's grade is above 70; Lv1: this course's grade is below 70.
7	**認識並遵循學術與工程倫理**(Understand and commit to academic and professional ethics.)
	為何有關：
	達成指標：
	評量方法：
8	**具國際觀及科技前瞻視野**(Have international view and vision of future technology)
	為何有關： This course explores the cutting-edge trends and technologies in wireless networks, drawing upon the latest research from leading conferences and journals.
	達成指標： Students will acquire knowledge through the presentation of papers and the participation in discussions that address the most recent trends and technologies in wireless networks.
	評量方法： Paper presentations and discussions. Lv5: this course's grade is above 85; Lv4: this course's grade is above 80; Lv3: this course's grade is above 75; Lv2: this course's grade is above 70; Lv1: this course's grade is below 70.