中正大學 資訊工程研究所 課程大綱

課程名稱(中文) (Chinese Course type)	電腦網路	開課單位 (Department)	資訊工程研究所
課程名稱(英文) (English Course name)	Computer Networks	課程代碼 (Course code)	4105400 4465019
授課教師 (Instructor)	阮文齡	學分數 (Credits)	3
必/選修 (Required/Selected)	☑ 必修 ☐ 選修	開課年級 (Level)	限碩博，不開放學士班
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)			
課程概述 (Course Descriptions)	The Internet has become a vital factor in human society. Many popular applications like Youtube, Facebook, or Line will not be able to operate properly if there is no Internet. The course provides a comprehensive understanding of how Internet applications work from a system and application-oriented perspective, such as how data is transmitted (encoding/decoding), routed through different geographical areas (routing and switching), and secured (security). The course also covers advanced networking topics such as resource allocation and multicast or mobile IP, which are crucial for building scalable network applications such as video streaming services and enterprise network applications (Internet of Things, smart cities). Finally, cutting-edge computer networks technologies such as Software-defined networking (SDN) and programmable networks are also discussed.		
學習目標 (Learning Objectives)	• To allow students to acquire the basics of network applications and protocols • To allow students to acquire the advanced network issues from a system approach like resource allocation and multicast. • To allow students to configure wireless/LAN/WLAN networks and deploy simple network applications • To allow students to master how to keep yourself updated about the latest networking technologies like SDN through reading training		
教科書 (Textbooks and Reference)	Computer Networks: A Systems Approach, 6th edition, Larry L. Peterson, Bruce S. Davie		

課程大綱(Course Syllabus)	分配時數 (Number of Hours)	核心能力 (Core	備註 (Remar

單元主題(Topic)	內容綱要(Content)	講授(Lecture)	示範(Demonstration)	習作(Assignment)	其他(Others)	Capabilities)	ks)
Foundations	● Computer network architecture ● Implement network software	6				■1 ■2 ■3 ■4 ■5 □6 □7 □8	
Networking in depth	• Network applications (Multimedia/Streaming) • Network infrastructure • End-to-End Data • End-to-End Protocols	12		3		■1 ■2 ■3 ■4 ■5 □6 □7 □8	
Internet Connection	• Switching • IP Routing • Ethernet/LAN • Wireless Networks	12				■1 ■2 ■3 ■4 ■5 □6 □7 □8	
Advanced networking	• Resource Allocation • TCP Congestion Control • Network security • Multicast • Mobile IP	12		3		□ 1 ■2 ■3 ■4 ■5 □6 □7 □8	
Advanced topics	• Software-defined networking • Programmable	6				■1 ■2 □	

	networks • SD-WAN, Open-RAN					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	☑講述 □問題導向學習	□小組討論 □個案研究	□學生口頭報告 □其他

Methods)	
評量工具 (Evaluation Tools)	☑上課點名 10% ☐隨堂測驗 0% ☑作業 10% ☐程式實作 0% ☐實習報告 0% ☐期中報告 0% ☐期末報告 0% ☐專題報告 0% ☑期中考 40% ☑期末考 30% ☐評量尺規 0% ☑其他 10%
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' sInformation)	
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：Students should have a solid foundation in networking fundamentals, including OSI and TCP/IP models, data transmission principles, and basic simulation skills (e.g., Packet Tracer, GNSS3). Familiarity with operating systems, computer architecture, and basic network protocols (e.g., HTTP, TCP, UDP) is essential. Prior experience with Linux command-line tools and networking concepts such as IP addressing, subnetting, and routing will be beneficial
	達成指標：Be able to understand and acquire the knowledge imparted in computer networks.
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
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：Students should be able to analyze and troubleshoot networking challenges by applying innovative solutions. The course encourages critical thinking in designing scalable and secure network architectures,

	optimizing performance, and addressing real-world issues such as congestion, mobility, and security threats. Independent research skills are essential for exploring emerging technologies like SDN, programmable networks, and IoT, enabling students to stay ahead in the rapidly evolving field of computer networks.
	達成指標： Creative on design the networks by Packet Tracer and fix the network problems in practice
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
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：Students should be able to clearly articulate networking concepts, research findings, and technical solutions in both written reports and oral presentations. Effective communication is essential for explaining network architectures, troubleshooting issues, and collaborating in team projects. The ability to discuss and document networking solutions in both Chinese and English will be crucial for engaging in academic, professional, and industry-related discussions.
	達成指標：Be able to write reports and present the work clearly
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
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：Students should be able to design, implement, and evaluate network-based projects by applying theoretical knowledge to practical scenarios. This includes defining project objectives, setting timelines, coordinating tasks, and troubleshooting network configurations. Effective planning and execution skills are essential for developing scalable and secure networking solutions, such as SDN applications, IoT infrastructures, and optimized routing strategies.
	達成指標：Be able to find the solutions for a given network problem
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above

	Level 1: Semester grades can be expected to be below 60 points
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：Students should be able to effectively communicate and collaborate with peers from diverse technical backgrounds, integrating knowledge from networking, security, and system engineering. This includes working in teams to design, implement, and optimize network solutions, coordinating tasks efficiently, and integrating different technologies to solve complex networking challenges. Strong teamwork and problem-solving skills are essential for addressing real-world networking issues in multi-disciplinary environments.
	達成指標：Be able to work with classmate to solve the given problem
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
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：Students should recognize the rapidly evolving nature of networking technologies and the need for continuous learning. This includes staying updated on emerging protocols, security threats, and advancements such as SDN, IoT, and AI-driven network management. The course encourages independent research, critical thinking, and proactive engagement with new developments to build adaptable skills for long-term success in the field.
	達成指標：Be able to design the network topology and address the networking issues
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
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：Students must adhere to ethical principles in networking, including responsible use of resources, data privacy, and adherence to security best practices. This includes maintaining academic integrity in coursework, avoiding unethical activities such as unauthorized access or network attacks, and upholding professional standards in designing, managing, and securing network systems. Ethical decision-making is essential for ensuring trust, security, and fairness in network

	applications and technologies.
	達成指標：Fully commit the academic integrity in using related materials
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points
8	**具國際觀及科技前瞻視野**(Have international view and vision of future technology)
	為何有關：Students should develop an awareness of international networking trends, global internet infrastructure, and emerging technologies such as SDN, IoT, and 6G. Understanding the impact of future innovations on global communication, cybersecurity, and smart city development is essential. The course encourages a forward-thinking mindset, preparing students to contribute to the evolution of next-generation networks in a globally connected world.
	達成指標：Be able to understand emerging network technologies and global network issues in the modern life
	評量方法： Level 5: Semester grade expected to be 90 and above Level 4: Semester grades can be expected to reach 80 points or above Level 3: Semester grades can be expected to reach 70 points or above Level 2: Semester grades can be expected to reach 60 points and above Level 1: Semester grades can be expected to be below 60 points