College of Software Engineering

Undergraduate Course Syllabus

Course ID	311234040	**Course Name**	Computer Networks and Distributed System
Course Attribute	■Compulsory ☐Selective	**Course Language**	☐English ■Chinese
Credit Hour	4	**Period**	68
Semester	☐First Fall ☐First Spring ☐Second Fall ☑Second Spring ☐Third Fall ☐Third Spring ☐Fourth Fall ☐Fourth Spring		
Instructors	Feng Lin, Yanhong Cheng, Wanzong Song		
Description	This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks and distributed Systems. Topics to be covered include: overview of network architectures, applications, network programming interfaces (e.g., sockets), transport, congestion, routing, and data link protocols, addressing, local area networks, wireless networks, network security, and distributed systems. Examples will be drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite.		
Prerequisites	Java Programming/C Programming Data Structures & Algorithm Computer Organization and Architecture Operating Systems		
Textbook	Computer Networking: A Top Down Approach Featuring the Internet (5th ed.), J.F. Kurose and K.W. Ross, Addison-Wesley Longman.		
Resource	1. Computer Networks (5th ed.): Andrew S. Tanenbaum, Tsinghua University Press 2. TCP/IP Illustrated, Volume 1: The Protocols, K. Fall, W.Richard Stevens, China Machine Press, 2016 3. TCP/IP Illustrated, Volume 2: The Implementation, Gary R.Wright, W. Richard Stevens, China Machine Press, 2019 4. Unix Network Programming, Volume 1: The Socket Networking APIs, W. Richard Stevens, Bill Fenner Posts & Telecom Press, 2019 5.Distributed Systems: Concepts and Design (15th ed.),George Coulouris, Jean Dollimor, Tim Kindberg, China Machine Press, 2013 **6.** other related websites		
Grading	attendance& class participation (10%) home assignments (10%), midterm exam (15%), course project & experiments (25%), final exam (40%)		

Topics	**Part 1: Introduction (8H)** what's the Internet? what's a protocol? network edge: hosts, access net, physical media network core: packet/circuit switching, Internet structure performance: loss, delay, throughput security protocol layers, service models history **Part 2: The Application Layer (8H)** Principles of network applications Web and HTTP FTP Electronic Mail: SMTP, POP3, IMAP DNS P2P applications Socket programming with TCP Socket programming with UDP PROGRAMMING ASSIGNMENT **Part 3: The Transport Layer (10H)** Transport-layer services Multiplexing and demultiplexing Connectionless transport: UDP Principles of reliable data transfer Connection-oriented transport: TCP segment structure reliable data transfer flow control connection management Principles of congestion control TCP congestion control **Part 4: The Network Layer (10H)** Introduction Virtual circuit and datagram networks What's inside a router IP: Internet Protocol Datagram format IPv4 addressing ICMP IPv6 Routing algorithms Link state Distance Vector Hierarchical routing Routing in the Internet RIP

	OSPF BGP Broadcast and multicast routing (Option) **Part 5: The Link Layer and Local Area Networks (6H)** Introduction and services Error detection and correction Multiple access protocols Link-layer Addressing Ethernet Link-layer switches PPP Link virtualization: MPLS(Option) A day in the life of a web request **Part 6: Introduction to Distributed System (6H)** Introduction and fundamental concepts System model Challenges Case Study: blockchain
Tools & Environment	Wireshark, PC with Internet Access, http://121.48.227.78:8086/
Labs & Project	**Labs (20H)** Practices network commands on Windows (1.5H) Configurations of IP Address (0.5H) Configurations of Web Server (1H) Configurations of DNS Server (1H) Configurations of FTP Server(1H) Configurations of DHCP Server(1H) Analysis the TCP segments with wireshark(2H) Analysis the FTP messages with wireshark(2H) Analysis the HTTP messages with wireshark(2H) Analysis the UDP segments with wireshark(2H) Configurations of default route on Router(1H) Configurations of Static route on Router(1H) Configurations of RIP protocol(1H) Configurations of OSPF protocol(1H) Configurations of VLAN(2H) Projects Each student has to choose one of the following 5 projects below to implement as his/her course project. The project should be implemented with Socket Programming. There are no special requirements for developing tools or deploy environments. 1. Multi-thread Web Server 2. Mail Client 3. Instant Messaging Utility

	4. Query-flooding-based Resource Sharer 5. Distributed Hash Table