



University of Tehran
School of Electrical and Computer Engineering

Course:	8101412 – Computer Networks									
Course type:	EE*						CE*			Credit: 3
	Com	E	P	B	Con	D	SW	HW	IT	
	Required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Elective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Level:	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
Co-requisite(s):	None.									
Prerequisite(s):	Operating Systems I (8101443)									
Prerequisite by topic:	Elementary engineering probability, Experience in a programming language, Linux operating system									
Textbook(s):	<p>[1] James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach, 7th edition, Pearson, 2017</p> <p>[2] Larry L. Peterson and Bruce S. Davie, Computer Networks, Fifth Edition: A Systems Approach, 5th edition, Morgan Kaufmann Publishers Inc., 2011</p>									
Coordinator:										
Goals:	The purpose of this course is to become familiar with the principles and practice of data networking; learn how to write applications that use the network; get some understanding about network internals in a hands-on way; explain the OSI model; recognize the primary network protocols and distinguish between centralized, client/server, and peer-to-peer systems; and distinguish between Local Area Networks (LANs) and Wide Area Networks (WANs) and identify the components used to expand a LAN into a WAN.									
Outcome:	1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.									
Topics:	<p>Review of fundamental concepts in networking and Internet</p> <ol style="list-style-type: none"> 1. Internet protocols and components in the edge and the core of the network 2. Performance concepts such as queue, delay, loss and throughput 3. Layered architecture <p>Application Layer</p> <ol style="list-style-type: none"> 1. Web and HTTP protocol 									

	<ol style="list-style-type: none"> 2. Electronic Mail and SMTP protocol 3. Internet's Directory Service and DNS protocol 4. P2P applications and P2P file distribution 5. Video streaming and DASH protocol 6. Content distribution and Cache 7. Socket programming <p>Transport Layer</p> <ol style="list-style-type: none"> 1. Multiplexing and de-multiplexing 2. UDP protocol 3. Principles of reliable transfer and GBN and SR protocols 4. TCP protocol, round-trip time estimation and flow control 5. Principles of congestion control <p>Network Layer: Data Plane</p> <ol style="list-style-type: none"> 1. Data and control planes 2. Router architecture 3. Addressing, IPv4 and IPv6 4. Network address translation and NAT protocol 5. Generalized forwarding (SDN) and OpenFlow protocol <p>Network Layer: Control Plane</p> <ol style="list-style-type: none"> 1. LS and DV routing algorithms 2. Intra-AS routing and OSPF protocol 3. Inter-AS routing and BGP protocol 4. SDN control plane 5. ICMP and SNMP protocols <p>Data Link Layer and LANs</p> <ol style="list-style-type: none"> 1. The data link layer services 2. Error-Detection and –Correction techniques 3. Multiple access protocols 4. Local area networks, Ethernet, ARP protocol and VLAN protocol 5. Link virtualization and MPLS protocol 6. Data center networking 								
Computer usage:	Ubuntu operating system. Python and Java programming languages. Mininet network emulator.								
Assignments:	5 assignments								
Projects:	5 projects in the areas of socket programming, application layer programs, reliable data transfer techniques, routing and security.								
Grading:	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Assignments:</td> <td style="text-align: right;">10 %</td> </tr> <tr> <td>Projects:</td> <td style="text-align: right;">20 %</td> </tr> <tr> <td>Midterm exam:</td> <td style="text-align: right;">35 %</td> </tr> <tr> <td>Final exam:</td> <td style="text-align: right;">35 %</td> </tr> </table>	Assignments:	10 %	Projects:	20 %	Midterm exam:	35 %	Final exam:	35 %
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Further readings:									

Prepared by:	
Date:	

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		