

College of San Mateo
Official Course Outline

1. COURSE ID: CIS 151 **TITLE:** Computer Networking

Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 96.0-108.0 Homework hours

Method of Grading: Grade Option (Letter Grade or Pass/No Pass)

Recommended Preparation:

Eligibility for ENGL 838 or ENGL 848 or ESL 400.
CIS 110 or work experience in the IT field.

2. COURSE DESIGNATION:

Degree Credit

Transfer credit: CSU; UC

3. COURSE DESCRIPTIONS:

Catalog Description:

Introduction to networks and digital communications with a focus on Internet protocols: Application layer architectures (client/server, peer-to-peer) and protocols (HTTP-web, SMTP-mail, etc.), Transport layer operation: (reliable transport, congestion and flow control, UDP, TCP); Network layer operation - (routing, addressing, IPv4 and IPv6), Data Link layer operation (error detection/correction, access control, Ethernet, 802.11, PPP), Layer 2/3 protocols (ATM and MPLS); selected current topics such as: security, multimedia protocols, Quality of Service, mobility, wireless networking, emerging protocols, network management.

4. STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

1. Describe the essential principles of a transport layer protocol (reliable data transfer, flow control, congestion control)
2. Explain the concept of packet-switching, and identify and analyze the different types of packet delay in packet-switched networks
3. Use IP addressing and apply routing algorithms to find shortest paths for network-layer packet delivery
4. Describe and compare data link layer services and multiple access techniques
5. Describe network security issues and some of the methods that address them
6. Use networking tools to observe and analyze behaviors of networking protocols

5. SPECIFIC INSTRUCTIONAL OBJECTIVES:

Upon successful completion of this course, a student will be able to:

1. Become familiar with layered communication architectures (OSI and TCP/IP).
2. Understand the client/server model and key application layer protocols.
3. Learn sockets programming and how to implement client/server programs.
4. Understand the concepts of reliable data transfer and how TCP implements these concepts.
5. Know the principles of congestion control and trade-offs in fairness and efficiency.
6. Learn the principles of routing and the semantics and syntax of IP.
7. Understand the basics of error detection including parity, checksums, and CRC.
8. Know the key protocols for multimedia networking including IntServ and DiffServ for IP.

6. COURSE CONTENT:

Lecture Content:

- Protocol layers and service models. OSI and Internet protocols.
- What is the Internet? Concepts of delay, security, and Quality of Service (QoS).
- Application layer protocols and client-server model.
- Sockets programming.
- Reliable data transfer. Stop-and-Go evaluation. TCP and UDP semantics and syntax.
- TCP RTT estimation. Principles of congestion control.
- Security. Overview of threats, cryptography, authentication, and firewalls. Discussion of project.
- Principles of routing. Link-state and distance vector. IP semantics and syntax.
- Link-state and distance vector routing.
- Link layer. Error detection. Multiple access protocols. IEEE 802.3 Ethernet.
- Switching and bridging. Media. Signal strength. Data encoding.
- Wireless and mobile networks.

- Network management including SNMP. Network troubleshooting.
- Hot topics such as SDN and IoT.

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- Lecture
- Critique
- Activity
- Discussion
- Guest Speakers
- Other (Specify): Research assignments and Individual or group project presentations.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Each chapter has an assignment. It may be a hands on experiment or a written assignment like that shown below.

EXAMPLE: After Reading Chapter 3 answer the following questions. Responses should be well written, grammatically correct, and submitted as a .pdf file.

1 Discuss your views on Government Policies and Regulations concerning computer security including the U.S. government's policy of regulating encryption algorithms.

1 "In September 1998, the Electronic Disturbance Theater, a group of activists that practices politically driven cyber civil-disobedience, launched an attack aimed at disabling a Pentagon Web site by flooding it with requests. The Pentagon responded by redirecting the requests to a Java applet programmed to issue a counteroffensive. The applet flooded the browsers used to launch the attack with graphics and messages, causing them to crash. The incident raises issues all user organizations will soon have to grapple with, if they haven't already. When you detect a break-in, should you launch a counterattack in order to protect your network? Is law enforcement capable of stopping cybercrime and can it be trusted to keep investigations quiet? If not, don't corporations have a right to defend themselves?"

Reading Assignments:

Students are required to read on average 40-50 pages per week.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- Class Participation
- Class Work
- Exams/Tests
- Homework
- Quizzes
- Written examination
- 1- Student participation and contribution to class and group discussions 2- Student participation and contribution to group projects.

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- Kurose James, Ross Keith. *Computer Networking: A Top-Down Approach*, seventh edition ed. Pearson, 2017
- Peterson Larry, Davie Bruce. *Computer Networks: A Systems Approach*, fifth edition ed. Morgan Kaufmann, 2011

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