I.   CATALOG INFORMATION

A.   Discipline: COMPUTER NETWORKING SYSTEMS ENGINEERING (CNSE)

B.   Subject Code and Number: CNSE M13

C.   Course Title: Internetworking and TCP/IP

D.   Credit Course units:

Units: 4

Lecture Hours per week: 4

Lab Hours per week : 0

Variable Units : No

E.   Student Learning Hours:

Lecture Hours:

Classroom hours: 70 - 70

Laboratory/Activity Hours:

Laboratory/Activity Hours 0 - 0

Total Combined Hours in a 17.5 week term: 70 - 70

F.   Non-Credit Course hours per week _____

G.   May be taken a total of: [X] 1 [ ] 2 [ ] 3 [ ] 4 time(s) for credit

H.   Is the course co-designated (same as) another course: No [X] Yes [ ]
If YES, designate course Subject Code & Number: _____

I.   Course Description:

Examines protocols used in Internetworking. Focuses on Transport Control Protocol/Internet Protocol (TCP/IP) versions 4 and 6. Explores protocol architectures and devices such as switches and routers. Applies tools used in network management including Wireshark Protocol Analysis software.

J.   Entrance Skills

*Prerequisite: No [X] Yes [ ] Course(s)

_____

*Corequisite: No [X] Yes [ ] Course(s)

_____

Limitation on Enrollment: No [X] Yes [ ]

_____

Recommended Preparation: No [ ] Yes [X] Course(s)
   CNSE M05 or CNSE M18

Other: No [X] Yes [ ]

_____

K.   Other Catalog Information:

II.   COURSE OBJECTIVES

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

		Methods of evaluation will be consistent with, but not limited by, the following types or examples.
1	identify Transmission Control Protocol/Internet Protocol (TCP/IP) layers versions 4 and 6, components and functions.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
2	identify the services that TCP/IP applications provide.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
3	describe expected protocol behaviors used to transport data over the Internet.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
4	identify various tools used in troubleshooting TCP/IP environments including tools that are Graphical User Interface and Command Line-based.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
5	create addressing schemes needed to support the required number of hosts and networks in an organization.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
6	research current and future usage of Internet technologies for personal and business usage.	Quizzes Midterms Final exam Classroom project work demonstrating competency

		in this area
7	describe the managing organizations of the Internet.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
8	describe methods used to access various Internetworking applications.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
9	describe the use of various protocols used in routers and switches in networks.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
10	contrast and compare various configurations used in switching technologies.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
11	describe appropriate usage of disparate switches and routers in Internetworks.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
12	contrast and compare routing methodologies and routing protocols.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
13	describe benefits of Virtual Local Area Networks (LANs) in networks.	Quizzes Midterms Final exam Classroom project work demonstrating competency

	in this area	
14	describe how protocols such as Open Shortest Path First (OSPF) and Routing Internet Protocol (RIP) are used by routers.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area
15	list the functions of Simple Network Management Protocol (SNMP) used in network management and describe similar protocols used in network management.	Quizzes Midterms Final exam Classroom project work demonstrating competency in this area

III. COURSE CONTENT

Estimated %	Topic	Learning Outcomes
Lecture (must total 100%)		
13.00%	TCP/IP Protocols	1, 3, 9, 12, 15
13.00%	How TCP/IP Applications Work	6, 8, 9, 12
6.60%	Troubleshooting a TCP/IP Network	4
6.60%	Virtual Local Area Networks	9, 10, 11, 13
6.60%	TCP/IP Concepts and Overview	1, 2, 3, 7
13.00%	TCP/IP Structure and Addressing	5
6.60%	Gateways and Protocol Converters	9, 12
7.00%	Switched Network Environments and Usage	9, 10, 11
7.00%	Router Protocols and Configuration	9, 11, 12, 14
7.00%	Internetworking Devices and Concepts Routers, Switches, Wireless Access Points Function and Usage	9, 10, 11, 12, 14
7.00%	Connecting Multiple Networks	9, 11
6.60%	Simple Network Management Protocol and Remote Monitor Protocols	15

IV. TYPICAL ASSIGNMENTS
A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:	
1	complete short-answer class assignments on topics such as Open Systems Interconnection model.
2	write a short paper describing the use of various protocols and their behaviors.
3	submit a written response to 3 mini-research assignment topics.

B.   Appropriate outside assignments

Appropriate outside assignments are required. Possible assignments may include, but are not limited to:	
1	answer assignment questions after viewing online video activities.
2	read and compare vendor websites as part of research assignments; examples include: Cisco.com, Microsoft.com, Wikipedia.com, etc.
3	read about how network devices send packets of data to each other and write a summary of what you learned.
4	complete assigned exercises on the needs benefits of Internet Protocol version 6.

C.   Critical thinking assignments

Critical thinking assignments are required. Possible assignments may include, but are not limited to:	
1	compare and contrast various protocols.
2	submit evidence of captured network data along with analysis, a common practice used in industry for network traffic forensics when troubleshooting connectivity or performance problems.
3	compare various behaviors related to Transmission Control Protocol such as window size, role of sequencing and acknowledgements.

V.   METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

[X]   Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)

[X]   Lecture/Discussion

[ ]   Laboratory/Activity

[X]   Other (Specify)
       Use of online learning tools that facilitate group discussion
       Collaboration to support a virtual classroom
       Students in CNSE online classes will be provided with workshops on:
       1) Using Wireshark
       2) Network Addressing
       3) Switches
       4) Routers

[ ]   Optional Field Trips

[ ]   Required Field Trips

VI. METHODS OF EVALUATION
Methods of evaluation may include, but are not limited to:

☐	Essay Exam	☒	Classroom Discussion	☒	Skill Demonstration
☒	Problem Solving Exam	☒	Reports/Papers/ Journals	☒	Participation
☒	Objective Exams	☒	Projects	☒	Other (specify)

Satisfactory completion of online assignments.

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS

Forouzan, Behrouz. TCP/IP Protocol Suite. 4th ed. McGraw-Hill, 2010.

Pyles, James, Jeffrey Carrell, and Ed Tittel. Guide to TCP/IP. 5th ed. Course Technology, 2017.

Wireshark Software. Wireshark.org, 2.x ed.
Free software used for network protocol analysis.

"Request for Comments (RFC)" website which documents ratified protocols and publishes standards online. http://www.ietf.org/rfc.html.

"The Internet Engineering Task Force (IETF)" is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. http://www.ietf.org.

VIII. STUDENT MATERIALS FEES

☒ No ☐ Yes

IX. PARALLEL COURSES

College	Course Number	Course Title	Units
American River College	CISN 308	Internetworking with TCP/IP	3
Cal State Monterey Bay	CST 284	LAN and WAN Internetworking	4.0
Ohlone College	CNET 157	TCP/IP and Internetworking	3
Santa Barbara City College	CNEE 124	Internetworking with TCP/IP	3

X. MINIMUM QUALIFICATIONS

Courses in Disciplines in which Masters Degrees are not expected:
Any bachelor's degree and two years of experience, or any associate degree and six years of experience.

XI. ARTICULATION INFORMATION
A. Title V Course Classification:
1. This course is designed to be taken either:

☐ Pass/No Pass only (no letter grade possible); or

☒ Letter grade (P/NP possible at student option)

2. Degree status:
   Either ☒ Associate Degree Applicable; or ☐ Non-associate Degree
   Applicable

B. Moorpark College General Education:
    1. Do you recommend this course for inclusion on the Associate Degree
       General Education list?
       Yes: ☐ No: ☒ If YES, what section(s)?

       ☐ A1 - Natural Sciences - Biological Science
       ☐ A2 - Natural Sciences - Physical Science
       ☐ B1 - Social and Behavioral Sciences - American History/Institutions
       ☐ B2 - Social and Behavioral Sciences - Other Social Behavioral Science
       ☐ C1 - Humanities - Fine or Performing Arts
       ☐ C2 - Humanities - Other Humanities
       ☐ D1 - Language and Rationality - English Composition
       ☐ D2 - Language and Rationality - Communication and Analytical
       Thinking
       ☐ E1 - Health/Physical Education
       ☐ E2 - PE or Dance
       ☐ F - Ethnic/Gender Studies

C. California State University(CSU) Articulation:

    1. Do you recommend this course for transfer credit to CSU?   Yes: ☒ No:
       ☐

    2. If YES do you recommend this course for inclusion on the CSU General
       Education list?
       Yes: ☐ No: ☒ If YES, which area(s)?

       A1 ☐   A2 ☐   A3 ☐   B1 ☐   B2 ☐   B3 ☐   B4 ☐

       C1 ☐   C2 ☐   D1 ☐   D2 ☐   D3 ☐   D4 ☐   D5
       ☐
       D6 ☐   D7 ☐   D8 ☐   D9 ☐   D10 ☐   E ☐

D. University of California (UC) Articulation:

    1. Do you recommend this course for transfer to the UC?   Yes: ☐ No: ☒

    2. If YES do you recommend this course for the Intersegmental General
       Education Transfer Curriculum (IGETC)?   Yes: ☐ No: ☒

       IGETC Area 1: English Communication

            ☐ English Composition
            ☐ Critical Thinking-English Composition
            ☐ Oral Communication

       IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

            ☐

☐ Mathematical Concepts

IGETC Area 3: Arts and Humanities

☐ Arts

☐ Humanities

IGETC Area 4: Social and Behavioral Sciences

☐ Anthropology and Archaeology

☐ Economics

☐ Ethnic Studies

☐ Gender Studies

☐ Geography

☐ History

☐ Interdisciplinary, Social & Behavioral Sciences

☐ Political Science, Government & Legal Institutions

☐ Psychology

☐ Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)

☐ Physical Science Lab or Physical Science Lab only (none-sequence)

☐ Physical Science Lecture only (non-sequence)

☐ Biological Science

☐ Physical Science Courses

☐ Physical Science Lab or Biological Science Lab Only (non-sequence)

☐ Biological Science Courses

☐ Biological Science Lab course

☐ First Science course in a Special sequence

☐ Second Science course in a Special Sequence

☐ Laboratory Activity

☐ Physical Sciences

IGETC Area 6: Language other than English

☐ Languages other than English (UC Requirement Only)

☐ U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

☐ U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

XII.   REVIEW OF LIBRARY RESOURCES

A.   What planned assignment(s) will require library resources and use?

The following assignments require library resources:
Research, using the Library's print and online resources, on a possible topic

such as the difference between Internet Protocol version 6 and the previous Internet Protocol version 4.

B. Are the currently held library resources sufficient to support the course assignment?

YES: ☒ NO: ☐

If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION

CNSE M13: Not Applicable

XIV. WORKPLACE PREPARATION

Required for career technical courses only. A career technical course/program is one with the primary goal to prepare students for employment immediately upon course/program completion, and/or upgrading employment skills.

Detail how the course meets the Secretary of Labors Commission on the Achievement of Necessary Skills (SCANS) areas. (For a description of the competencies and skills with a listing of what students should be able to do, go to: http://www.ncrel.org/sdrs/areas/issues/methods/assment/as7scans.htm)

The course will address the SCANS competency areas:

1. Resources: the students will identify, organize, plan and allocate resources through course work and the application of theory to practice.

2. Interpersonal: the students will work together as a team to build, evaluate projects, and solve technical problem scenarios.

3. Information: the students will acquire and use information through a variety of assignments, network technology tools, and computer software used in computer network systems.

4. Systems: the students will employ a variety of computer tools to complete projects or assess computer networking problems.

5. Technology: the students will use modern technology to acquire skills needed to prepare for a career.

The course also addresses the SCANS skills and personal qualities:

1. Basic Skills: the students will read, perform computer mathematic operations, listen, and speak in order to complete weekly assignments and participate in classroom discussions.

2. Thinking Skills: the students will think creatively and make decisions in order to solve computer network problems and demonstrate reasonable problem solving skills.

3. Personal Qualities: the students will be required to display responsibility, self-management, integrity, and honesty throughout course work and classroom exercises.

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

1. Mode of Delivery

 Online (course will be delivered 100% online)

 Online with onsite examinations (100% of the instruction will occur online, but examinations and an orientation will be scheduled onsite)

 Online/Hybrid (a percentage of instruction will be held online and the remaining percentage of instruction will be held onsite)

        ☐ Lab activities will be conducted onsite

☐ Televideo (Examinations and an orientation will be held onsite)

☐ Teleconference

☐ Other

2.   Need/Justification

      Improve general student access.

3.   Describe how instructors teaching this course will ensure regular, effective contact with and among students.

      Students will use discussion boards and integration of assignments into assessments to ensure completion. Students are informed at orientation and indicated in syllabus that weekly discussion is required and that optional hands-on opportunities will be provided during the semester for students needing help with assignments. These hands-on opportunities typically include network addressing workshop, and Wireshark Protocol Analysis workshop.

4.   Describe how instructors teaching this course will involve students in active learning.

      Students may perform interactive online activities, engage in discussion groups, participate in chat rooms, submit written assignments via email, perform computer lab simulations, and other electronically-based assignments. Online videos include Wireshark videos to reinforce online learning and provide additional avenues for active learning. Students will turn in assignments based on assigned videos.
Students will also be tested on video assignments.

5.   Explain how instructors teaching this course will provide multiple methods of content representation.

      Instructors will provide web-based materials, computer simulations, interactive online assignments and other methods as determined by the instructor, in addition to the more traditional materials and resources.

6.   Describe how instructors teaching this course will evaluate student performance.

      Methods of evaluation may consist of electronical assessments, exams and/or assignments, participation in chat sessions and/or asynchronous discussion forums, submission of written work electronically, assignment write-ups of computer network simulations, and other evaluation methods as determined by the instructor. Instructor may also evaluate performance via on-site quizzes and exams.Students will turn in assignments based on assigned videos.
Students will also be tested on video assignments.

XVI. **GENERAL EDUCATION COURSE OUTLINE ADDENDUM**

CNSE M13: Not Applicable

XVII. **STUDENT MATERIALS FEE ADDENDUM**

CNSE M13: Not Applicable

XVIII. **REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041**

CNSE M13: Not Applicable

XIX. **CURRICULUM APPROVAL**

Course Information:
Discipline:
COMPUTER NETWORKING SYSTEMS ENGINEERING (CNSE)

Discipline Code and Number: CNSE M13

Course Revision Category: Technical Course Revision

Course Proposed By:
Originating Faculty Edmond Garcia 09/02/2017

Faculty Peer: Edmond Garcia 09/05/2017

Curriculum Rep: _____

Department Chair: Navreet Sumal 09/02/2017

Division Dean: Howard Davis 09/14/2017

Approved By:
Curriculum Chair: Jerry Mansfield 10/13/2017

Executive Vice President: Julius Sokenu 10/13/2017

Articulation Officer: Letrisha Mai 09/21/2017

Librarian: Mary LaBarge 09/20/2017

Implementation Term and Year: Fall 2018

Approval Dates:
Approved by Moorpark College Curriculum Committee: 10/03/2017

Approved by Board of Trustees (if applicable): _____

Approved by State (if applicable): 11/04/2017