I. CATALOG INFORMATION

A. Discipline: COMPUTER NETWORKING SYSTEMS ENGINEERING (CNSE)

B. Subject Code and Number: CNSE M50

C. Course Title: Fundamentals of Voice over IP

D. Credit Course units:

Units: 2

Lecture Hours per week: 1

Lab Hours per week : 3

Variable Units : No

E. Student Learning Hours:

Lecture Hours:

Classroom hours: 17.5 - 17.5

Laboratory/Activity Hours:

Laboratory/Activity Hours 52.5 - 52.5

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:

Provides the student with fundamental knowledge to configure, troubleshoot and implement Voice over IP (Internet Protocol) using IP Telephony technologies. Includes configuration of Call Manager Express phone systems using gateways and trunks.

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 M18or equivalent

Other: No [ ] Yes [X]
 Basic networking skills including access-list creation, and command line router configuration., Student should be familiar with: 1) Basic configuration experience

with router command line syntax 2) How to configure features and configure interfaces 3) Creating and applying access-list statements

K.   Other Catalog Information:

Prepares students for relevant certification exams.

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.
	Evaluate Voice over IP Technologies	**Assessment**
A1	describe the similarities and differences between PSTN (Public Switched Telephone Network) and VoIP (Voice over Internet Protocol) including call transport, call signaling and bandwidth requirements.	Graded assignments, quizzes, exams
A2	identify PSTN and TDM (Time Division Multiplexing) characteristics, transport.	Graded assignments, quizzes, exams
A3	explain TDM and statistical MUX (Multiplexing) as it relates to telephony.	Graded assignments, quizzes, exams
	Configure Voice over IP	**Assessment**
B1	configure a router so that a basic IP telephony call can be completed.	Graded assignments, lab projects, quizzes, exams
B2	configure dial-peer settings for VoIP or POTS (Plain Old Telephone System), gatekeeper.	Graded assignments, lab projects, quizzes, exams
B3	configure POTS ports FXS (Foreign Exchange Station) and FXO (Foreign Exchange Office), E&M (recEive and transMit).	Graded assignments, lab projects, quizzes, exams
B4	configure default dial-peer, inbound/outbound dial peers, hunt groups.	Graded assignments, lab projects, quizzes, exams
B5	configure digit collection, consumptions and manipulations.	Graded assignments, lab projects, quizzes, exams
	Integrate Voice over IP into Existing PBX networks	**Assessment**
C1	integrate a basic IP telephony network into an existing PBX (Private Branch Exchange) network.	Graded assignments, lab projects, quizzes, exams

C2	explain port and signaling requirements for connection to a PBX.	Graded assignments, quizzes, exams
C3	choose correct connection type between PBX and VoIP networks.	Graded assignments, lab projects, quizzes, exams
C4	successfully connect a basic Voice over IP network into the PSTN.	Graded assignments, lab projects, quizzes, exams
C5	describe digit manipulation.	Graded assignments, quizzes, exams
C6	explain the international public telecommunication plan called E.164 phone number addressing scheme and discuss various implementation strategies. (E.164 was known as "Numbering plan for the ISDN [Integrated Services Digital Network] Era").	Graded assignments, lab projects, quizzes, exams

Describe Call Operation and Components in Voice over IP	Assessment
D1	explain various VoIP protocols including: RTP (Real-time Transport Protocol), RTCP (RTP Control Protocol), CRTP (Compression RTP), multimedia protocol standard H.323, MGCP (Media Gateway Control Protocol), SIP (Session Initiation Protocol), and QOS (Quality of Service).	Graded assignments, quizzes, exams
D2	explain the process of packetization (frames, codec types).	Graded assignments, quizzes, exams
D3	choose the appropriate codec for a given situation.	Graded assignments, lab projects, quizzes, exams
D4	explain the function, operation, and purpose of call-legs.	Graded assignments, quizzes, exams

III.   COURSE CONTENT

Estimated %	Topic	Learning Outcomes
Lecture (must total 100%)		
15.00%	Evaluate Voice over IP Technologies	A1, A2, A3
35.00%	Configure Voice over IP	B1, B2, B3, B4, B5
25.00%	Integrate Voice over IP into existing PBX networks	C1, C2, C3, C4, C5, C6

25.00%	Describe Call Operation and components in Voice over IP	D1, D2, D3, D4
Lab (must total 100%)		
20.00%	Configure a router so that a basic IP telephony call can be completed	B1, B2
20.00%	Configure dial-peer settings for VoIP or POTs, gatekeeper	B2, B3
20.00%	Configure POTs ports (FXS and FXO), E&M	B3
20.00%	Configure default dial-peer, inbound/outbound dial peers, hunt groups	B4
20.00%	Configure digit collection, consumptions and manipulations	B5

IV. TYPICAL ASSIGNMENTS

A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:	
1	provide written solutions to technical requirements so that voice equipment and/or component configurations are ready for deployment.
2	communicate technical requirements into a written project plan.

B. Appropriate outside assignments

Appropriate outside assignments are required. Possible assignments may include, but are not limited to:	
1	read textbook, research technical websites, review case studies.
2	provide configuration solutions and be prepared to discuss or support solutions from vendor manuals or user guide information.

C. Critical thinking assignments

Critical thinking assignments are required. Possible assignments may include, but are not limited to:	
1	design VoIP configurations based on technical and business requirements while understanding advantages and disadvantages of alternative configurations.
2	solve lab scenarios using troubleshooting skills that identify cause, and/or severity of problem as well as solutions.

V. METHODS OF INSTRUCTION

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

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

☒ Lecture/Discussion

☒ Laboratory/Activity

☒ Other (Specify)
Review of various online 3rd party IP Telephony solutions, vendor(s) configuration guides, etc.

☐ 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)

Assess troubleshooting skills in a Lab environment

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS

Cioara, Jeremy and Michael Valentine. <u>CCNA Voice 640-461 Official Certification Guide</u>. Cisco, 2011.

Sieling, Brent. <u>CCNA Voice Lab Manual</u>. Cisco, 2013.

Vendor Guides, by Cisco, Avaya, Proxim, etc.

VIII. STUDENT MATERIALS FEES

☒ No   ☐ Yes

IX. PARALLEL COURSES

College	Course Number	Course Title	Units
College of the Canyons	CMPNET 261	CCVP-1: Preparation for CVOICE	3.5
Cypress College	CIS 248 C	Voice Over IP	3

X. MINIMUM QUALIFICATIONS

Courses in Disciplines in which Masters Degrees are not expected:
Any bachelor's degree and two years of related technical experience, or any associate degree and six years of related technical 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 print and online resources, to support classroom labs and help students gain a stronger understanding of concepts, theory, protocols, device configurations, vendor equipment, and other useful online information.

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 M50: 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 application of theory to practice.

2. Interpersonal: the students will work together as a team to build and 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 the skills needed to prepare for a career.

The course also addresses the SCANS skills and personal qualities:

1. Basic Skills: the students will perform router configuration based on requirements, listen and collaborate on weekly assignments and participate in classroom discussions.

2. Thinking Skills: the students will collaborate and make decisions in order to solve VoIP system 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

CNSE M50: Not Applicable

XVI. GENERAL EDUCATION COURSE OUTLINE ADDENDUM

CNSE M50: Not Applicable

XVII. STUDENT MATERIALS FEE ADDENDUM

CNSE M50: Not Applicable

XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041

CNSE M50: Not Applicable

XIX.   CURRICULUM APPROVAL

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

Discipline Code and Number: CNSE M50

Course Revision Category: Outline Update

Course Proposed By:
Originating Faculty Edmond Garcia 11/27/2013

Faculty Peer: Martin Chetlen 11/30/2013

Curriculum Rep: Christine Aguilera 11/28/2013

Department Chair: Martin Chetlen 11/30/2013

Division Dean: Lisa Putnam 12/03/2013

Approved By:
Curriculum Chair: Jerry Mansfield 12/14/2013

Executive Vice President: Lori Bennett 12/18/2013

Articulation Officer: Letrisha Mai 12/04/2013

Librarian: Mary LaBarge 12/04/2013

Implementation Term and Year: Fall 2014

Approval Dates:
Approved by Moorpark College Curriculum Committee: 12/10/2013

Approved by Board of Trustees (if applicable): _____

Approved by State (if applicable): _____