

OHLONE COLLEGE
Ohlone Community College District
OFFICIAL COURSE OUTLINE

I. Description of Course:

1. **Department/Course:** CNET - 180
2. **Title:** IP Telephony and VoIP Implementations
3. **Cross Reference:**
4. **Units:** 2
Lec Hrs: 1.5
Lab Hrs: 1.5
Tot Hrs: 54.00
5. **Repeatability:** Yes Times:3
6. **Grade Options:** Letter Grade, May Petition for Pass/No Pass (GP)

7. **Degree/Applicability:**
Credit, Degree Applicable, Transferable - CSU (T)
8. **General Education:**
9. **Field Trips:** Not Required
10. **Requisites:**
Advisory
CNET 155A Network Fundamentals (Cisco Networking Academy CCNA I)
CNET 155B Routing Protocols and Concepts (Cisco Networking Academy CCNA II)
CNET 156A LAN Switching and Wireless
CNET 156B WAN Design and Support

12. Catalog Description:

The course offers an overview of the issues related to carrying voice on a data network, the protocols used, and the issues associated with QoS, troubleshooting, security, and design. The course begins with describing the basic technologies used in the Public Switched Telephone System. It then describes the challenges and technologies used to send voice calls over a packet switch network like the Internet.

13. Class Schedule Description:

Introduction to the convergence and application of IP Telephony and VoIP.

14. Counselor Information:

Success in this course is aided by strong knowledge of IP networks or telecommunication systems. Content of the course maps to the Cisco certification for CCNA Voice.

II. Student Learning Outcomes

The student will:

1. Describe the components, structure and operation of the Public Switched Telephone Network.
2. Install and configure VOIP and IP Telephony voice and data networks.
3. Describe the features and processes which comprise Enterprise Telephony.
4. Discuss the design criteria for VoIP and IP telephony implementations.
5. Describe the important signaling protocols used in Enterprise Telephony systems.
6. Describe the operation of packet switching networks. Compare packet switching and circuit switching networks for transporting voice traffic.

III. Course Outline:

- A. Public Switched Telephone System (PSTN)
 - 1. Components
 - a. Local Loop
 - b. Central Office Switch
 - c. Internal Operation of Circuit Switch Telephone
 - 2. Call Signaling and Control
 - a. Supervisory, Informational, and Status
 - b. Steps in POTS Call
 - 3. Interfaces
 - a. Analog
 - b. Digital
 - 4. Convergence Networks
 - 5. Lab - Basic POTS
- B. Enterprise Telephony
 - 1. Comparison of POTS and Enterprise Telephony
 - 2. ET Services
 - a. Custom Call Features
 - b. CLASS Features
 - c. Added Value Service
 - 3. ET Implementations
 - a. PBX and Centrix
 - b. Key Systems
- C. Voice over IP Technology
 - 1. Digital Conversion
 - a. Digitization of Sound
 - b. NyQuist Theorem
 - c. Sound Samples
 - 2. Call Control and Signaling Requirements
 - 3. Operation of Packet Switch Networks
 - a. Real Time Data Requirements

- b. Comparison of Circuit Switch and Packet Switch
 - c. Convergence of Data and Voice Networks
 - 4. Creation of Voice Packets
 - a. Digital Sound Processor
 - b. Sound Packet Encapsulation
 - c. Real Time Protocol
 - d. RTP, UDP, IP Overhead
 - D. Implementation of a VoIP System
 - 1. CME Features and Interfaces
 - a. FXS and FXO
 - b. Analog Trunks
 - c. Digital Interfaces - T1
 - 2. VoIP Software
 - a. Call Management
 - b. Sound Processing
 - c. Call Control and Signaling
 - 3. Operation of Digital PBX
 - a. Dial Plans
 - b. IP to Phone Number Mapping
 - c. Dial Peers
 - d. Special Circuits
 - E. Call Control and Signaling
 - 1. SS7 Digital Signaling
 - 2. Packet Switch Circuit Signaling Protocols
 - a. Distributed Call Managements
 - b. Centralized Call Management
 - F. H323 Signaling Protocol
 - 1. Basic H323 Suite
 - a. Call Setup and Control
 - b. Components

- c. CAC - Gatekeeper
 - 2. Protocol Operation
 - a. H.225 RAS
 - b. Call Control
 - c. H.245 Capability Exchange
 - 3. Lab - H323 Operation
- G. Session Initiation Protocol
 - 1. SIP Structure
 - a. SIP Addressing
 - b. SIP Components
 - 2. SIP Operation
 - a. SIP Requests
 - b. SIP Responses and Messages
 - 3. SIP Gateways
- H. Media Gateway Control Protocol
 - 1. MGCP Model
 - a. Endpoints
 - b. Call Agent
 - c. Call Flow
 - 2. MGCP Commands and Messages

IV. **Course Assignments:**

A. Reading Assignments

- 1. Textbook and online reading assignments.

B. Projects, Activities, and other Assignments

- 1. Hands on labs done independently and with classmates as part of a team.

C. Writing Assignments

- 1. Documentation where required.

V. **Methods of Evaluation/Assessment:**

- A. Objective Examinations
- B. Skills-based Assessments

VI. **Methods of Instruction:**

- A. Lecture
- B. Laboratory
- C. Demonstration
- D. Computer Assisted Instruction
- E. Other
 - 1. Online assessments and activities.

VII. Textbooks:

Recommended

1. Jeremy Cioara, Michael J. Cavanaugh, Kris A. Krake. *CCNA Voice Official Exam Certification Guide (640-460 IIUC)* 1st Edition, Cisco Press, 2008 ISBN: 10: 1-58720-207

Supplemental

VIII. Supplies:

CID 3091