Lecture Contact Hours: 32-36; Homework Hours: 64-72; Total Student Learning Hours: 96-108
Laboratory Contact Hours: 48-54; Homework Hours: 0; Total Student Learning Hours: 48-54

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

COMPUTER AND INFORMATION SCIENCE 121 – NETWORK CABLING SYSTEMS

2 hours lecture, 3 hours laboratory, 3 units

Catalog Description
This course introduces students to the basic concepts of network cabling systems. It focuses on network cabling design, installation, testing, certification and troubleshooting. Students will develop knowledge and skills in installing and testing voice and data cable connectors and jacks, horizontal links and channels, pulling and terminating cables, cable system certification, telecommunications room design, and patch panel installation. The laboratory component allows students to verify concepts introduced in class and develop the knowledge and skills required to build, test, operate and maintain the physical aspects of voice, video and data networks.

Prerequisite: None

Course Content
1) Introduction to Data Cabling
2) Cabling Technology and Components
3) Cabling Specifications and Standards
4) Selecting the Correct Cabling
5) Cabling System and Infrastructure Constraints
6) Cabling System Components
7) Cabling Tools
8) Copper Cable Media
9) Connectors, Jacks, Plugs, and Working Within Walls
10) Optical Fiber Media
11) Wireless Media
12) Cabling System Design and Installation
13) Cable Connector Installation
14) Cable Systems Testing and Certification
15) Responding to a Request for Proposal (RFP)

Course Objectives
Students will be able to:
1) Use network cabling system techniques to design, build, test, certify and troubleshoot copper and optical fiber cabling systems in accordance with TIA/EIA (Telecommunications Industry Association/Electronics Industry Alliance) telecommunication cabling standards.
2) Research, identify and compare/contrast key technical inventions and industry trends that have shaped the evolution of modern network cabling systems.
3) Use the “Request-for-Proposal” (RFP) process by responding to an actual network cabling installation RFP in a case study approach to learn both technical and cost estimation concepts.
4) Demonstrate termination and certification testing of unshielded twisted pair (UTP) copper, coaxial and fiber optic connectors and horizontal links in accordance with TIA/EIA telecommunication cabling standards.
5) Apply network cabling systems skills acquired in class to solve typical network cabling system problems such as slow or no computer access to the network due to faulty network cables.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

1) Quizzes, exams and practicum that measure students' ability to use network cabling system terminology and explain cabling concepts, designs, construction and troubleshooting concepts.
2) Practical hands-on cabling projects that measure students' knowledge and skills to design, build, test and certify network cabling systems and demonstrate a high level of proficiency in these topics; for example, designing, building, testing and certifying complete copper and optical fiber network cabling systems.
3) Labs that assess students' knowledge and skills to build and test electrical, electronic and cabling projects; for example, building and testing copper and optical fiber equipment and patch cords, terminating voice circuits on 66 and 110 punch-down blocks, and building a telephone key system.
4) Using a "real-world" case study, assess students' technical and business knowledge such as responding to a network cabling system installation RFP (Request-for-Proposal) with a technical and price proposal.
5) Exercises and labs that assess students' ability and skills to identify typical network cabling system problems and address those problems with practical solutions such as troubleshooting voice and data network cabling systems.
6) Instructor critique that requires students to verbalize and apply feedback to improve their work based on criteria specified by the instructor.

Special Materials Required of Student

Lab notebook and lab consumables ($27 lab fee)

Minimum Instructional Facilities

1) Computer and telecommunications lab with networked computers, Internet access, wiring rack, cabling
2) Hand tools and test instruments

Method of Instruction

1) Lecture and demonstration
2) Hands-on labs and practice
3) Online multimedia modules
4) Guest speakers
5) Assigned projects

Out-of-Class Assignments

1) Read textbook and assignment instructions
2) Complete assignments and online quizzes
3) Review online resources, including videos

Texts and References

1) Required (representative example): Oliviero, Andrew. *Cabling: The Complete Guide to Copper and Fiber-Optic Networking*. 6th edition. Sybex, 2018.
2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

1) Adhere to strict safety precautions related to personal and building safety.
2) Understand basic cable handling principles including proper bend radius, proper way to secure and dress cable, and various ways to pull cables.
3) Terminate UTP, coaxial and fiber optic media according to EIA/TIA standards.

4) Punch-down voice connections on 66 and 110 type punch down blocks.
5) Design and implement a telecommunications room to EIA/TIA standards.
6) Install raceways, gutters, tie wraps and ladder racks.
7) Develop a proposal to a Request-for-Proposal (RFP) case study.
8) Understand EIA/TIA specifications for horizontal cabling and backbone cabling.
9) Distinguish between Entrance Facilities (EF) and Telecommunications Rooms (TR).
10) Follow standard documentation procedures for cabling and physical network design and follow blueprints.
11) Understand the difference between physical and logical topology.
12) Take a problem-solving approach to cable testing; know correct usage of testing equipment including Time Domain Reflectometers (TDRs) and signal injectors.
13) Install, test and troubleshoot both copper and optical fiber voice and data network cabling systems.

Student Learning Outcomes

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

1) Complete a comprehensive project including a response to a Request for Proposal and hands-on/simulated installation, troubleshooting, and maintenance of a cabling system (>6 elements) that meets 70% of the technical, organizational, design, and presentation requirements outlined in a detailed scoring rubric based on the course content and objectives.