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CRT 151T.01: Networking Fundamentals

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THE UNIVERSITY OF MONTANA—MISSOULA
COLLEGE OF TECHNOLOGY

COURSE NO: CRT 151T, Networking Fundamentals

FACULTY:

Penny Jakes penny.jakes@umontana.edu 243-7804

OFFICE HOURS:

As posted or by appointment in office AD17A

Fall 2005

CREDITS: 3

COURSE DESCRIPTION:

Introduction to the networking field including terminology; protocols; local-area and wide-area networks; the OSI model; topologies; IP addressing; cabling and cabling tools; routers and router programming; Ethernet and network standards; and wireless technologies.

PREREQUISITE(S):

CRT 101T or Demonstrated Computing Experience

PERFORMANCE OUTCOMES:

At completion of course, students will be able to:

1. Compare and select appropriate internetworking devices to segment networks using the OSI model.
2. Design IP addressing schemes using standard subnetting techniques.
3. Choose a logical and physical LAN topology to solve networking problems.
4. Evaluate networking media, connectors, wiring closets, structured cabling, and patch panels to meet networking requirements.
5. Create, construct, and test a network using PC hardware and software, patch cables, installation of structured cabling, and digital test equipment.
6. Prepare network documentation: engineering journal, spreadsheets, protocol inspection tools, cut sheets, topologies.
7. Cooperate in engineering teams, engage in self and project management, offer solutions in oral exams, and participate in presentations.

REQUIRED TEXT:

CISCO: LAB COMPANION, VOL. I, Vito Amato, Cisco Press, Revised Third Edition, 2005.

OPTIONAL TEXT:

CISCO: FIRST-YEAR COMPANION GUIDE, Vito Amato, Cisco Press, Revised Third Edition, 2005.
ISBN: 1-58713-150-1

EVALUATION:

Assignments will be graded on a point system; total points possible will be announced at the start of each project. Quizzes and tests will also be on a point system. Total points earned will be divided by total points possible to get a percentage with grade conversion as follows:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D

Generally, no work will be accepted after due date unless arrangements are made prior to the due date.

Lab activities, group work, and pop quizzes will be done on scheduled day only with no opportunity for makeup.

FINAL GRADE: 15% on-line chapter quizzes
35% pop-quizzes, labs, lab tests, homework
20% on-line final
15% skills final
15% case study

ACCOMMODATION:

Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please speak with me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator.

UM Coordinator: Daniel J. Burke
243-4424
www.umt.edu/dss/

STUDENT CONDUCT CODE:

Students are expected to follow the University of Montana Student Code. The code includes the following:

... Academic misconduct is defined as all forms of academic dishonesty, including but not limited to:

- Plagiarism: Representing another person's words, ideas, data or material as one's own.
- Substituting or arranging substitution, for another student during an examination or other academic exercise.
- Knowingly allowing others to offer one's work as their own.

Student Code copies are available at Student Services or
www.umt.edu/studentaffairs/

EXPECTATIONS/POLICIES:

1. Class structure will include lectures on new material, assignments, lab assignments, group discussions, research of current periodicals and Internet, review, handouts, pop quizzes, and scheduled tests. Internet and e-mail is used extensively. Course curriculum is on-line.
2. Lab time is given in class for some projects. It is expected the student will need to spend two hours of outside work for each hour in class.
3. As each project is assigned, total points possible, due date, and specific requirements will be announced. Refer to the semester schedule on the web page for CRT151.
4. BASICS:
 - Treat other students, the instructor, and guests with courtesy and respect.
 - Please do your best to be on-time for class.
 - If you miss or are late, get material from another student.
 - Please listen when others are speaking.
 - Discrimination and harassment of any kind will not be tolerated.
 - Any misuse of the equipment, installing own software, or unprofessional conduct will not be tolerated.
 - For the courtesy of others, put all pagers and cell phones on silent or turn them off. If you need to take a call, do so outside of the classroom
 - Do not use computers during lectures unless you are following the lecture using the on-line curriculum. Check e-mail or surf web before or after class.

COURSE OUTLINE:

I. Introduction

- A. PC Hardware and Software
 - 1. Electronic components
 - 2. PC subsystems
 - 3. Backplane
 - 4. NIC
 - 5. Browsers/plug-ins
 - 6. Binary number system
 - 7. Troubleshooting
 - 8. Hexadecimal system
 - 9. MAC Addressing
- B. Journaling
- C. Networking
 - 1. Information flow
 - 2. Components
 - 3. Setup
 - 4. Industry standards
 - 5. LAN devices
 - a. NICs
 - b. Media
 - c. Repeaters/hubs
 - d. Bridges/switches
 - e. Routers
 - f. Clouds
 - g. Network segments
 - 6. Topologies
 - 7. Segmentation
 - 8. WANs
 - 9. Network Design
 - 10. Collision Domains
 - 11. Broadcast Domains
- D. Digital Bandwidth
 - 1. Measurements
 - 2. Media bandwidth differences
 - 3. Throughput
 - 4. Data transfer calculation

III. IP Addressing

- A. IP Classes
- B. ARP and RARP
- C. Subnet Masks
- D. Boolean Operations
- E. Creating Subnets
- F. Assigning Host Numbers
- G. Reserved space
- H. DHCP
- I. ARP/Proxy ARP
- J. Routed protocols
- K. Routing protocols
- L. Connectionless

II. OSI Model

- A. Encapsulation
- B. Physical Layer
- C. Data Link Layer
 - 1. MAC addresses
 - 2. Hexadecimal
 - 3. Frame format
 - 4. Topologies
 - 5. Media Access
 - 6. Troubleshooting
 - 7. IEEE 802.3/802.5/802.2
 - 8. Switches/bridges
- D. Network Layer
 - 1. Path determination
 - 2. Boolean operations
 - 3. Configuration
 - 4. Protocols
 - 5. ARP/RARP
 - 6. Segment with routers
 - 7. Datagrams
- E. Transport Layer
 - 1. Flow control
 - 2. Protocol stack
 - 3. Segment format
 - 4. TCP/UDP
 - 5. Ports/sockets
 - 6. Connection-oriented
 - 7. IGP vs. EGP
- F. Session Layer
- G. Presentation Layer
- H. Application Layer
- I. TCP/IP Layer comparisons
- J. Protocols

IV. Media and Design

- A. Structured cabling
- B. Wiring closets
- C. HCC and VCC
- D. Security
- E. Safety
- F. Wiring plans/cut sheets
- G. Installation of cabling

<p>V. Topologies</p> <ul style="list-style-type: none"> A. Star B. Extended Star C. Bus D. Token Ring 	<p>VI. Cabling and Electronics</p> <ul style="list-style-type: none"> A. Electricity basics B. Digital Multimeters C. Grounding D. Signaling E. Noise and interference F. Attenuation G. Cancellation H. Encoding I. Modulation J. CAT 5 cable/RJ45 connectors K. Patch panels/punch down L. Testing/troubleshooting M. Collisions N. Wiring Closets
<p>VIII. Final</p> <ul style="list-style-type: none"> A. On-line B. Oral/Written C. Skills 	