

# CIS243 – Computer & Communications Network

Cedar Crest College

Spring 2009

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## *COURSE CONTENT*

Computer networks have been growing explosively. Two decades ago, few people had access to a network. Today, it is an essential part of our infrastructure. Networking is used in virtually every aspect of business, education, the government, etc. How do these networks work? How do data interact and communicate between hetero- and homogeneous systems?

In this course the student will learn how data is communicated between computing devices. Conceptual and physical network designs and implementation will be discussed. Various hardware components (including switches, routers, and bridges) will be compared and contrasted. Internet tools and theories will be explored as well as their impact on applications and software development.

This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include: overview of network architectures, applications, network programming interfaces (e.g., sockets), transport, congestion, routing, and data link protocols, addressing, local area networks, network security, network management, and emerging high-speed networks. Examples will be drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite.

The course is instructor-led in a computer laboratory. Topics are discussed in a lecture-style format and, as availability permits, a fixed time is provided for students to perform similar tasks. Because of the volume of students, individualized, hands-on instruction is not feasible. Laboratory time is scheduled; however, information technology classes require practice, extensive research, and commitment outside of class. As assignments increase in difficulty increased commitment is required by the student.

Access to the Networking Laboratory in Curtis will be scheduled and the student is responsible for scheduling time to complete assignments in this lab. It is the sole responsibility of the student to manage time appropriately to gain access to the networking lab to meet the deadlines set forth in the assignment.

## *CREDIT VALUE*

Three (3) credits

## *PREREQUISITE*

CIS101 or equivalent computer experience.

## *TEXTS AND MATERIALS (Title/ Edition, Author, Publisher, ISBN)*

Computer Networking: A Top-Down Approach Featuring the Internet, 4<sup>th</sup> Ed.

James Kurose & Keith Ross; Addison-Wesley; ISBN 0-321-49770-8

looseleaf notebook

Microsoft Windows operating system

Microsoft Office 2000, XP, 2003, or 2007 application suite

GroupWise electronic mail system

Internet Explorer web browser

at least two (2) High Density 3½ Diskettes or one USB drive

## *COURSE EXPECTATIONS, OBJECTIVES, AND OUTCOMES*

The goal of this course is to provide the student with competency of computer networking. This includes theoretical and applied proficiencies regarding networks.

After completing this course you should be able to:

1. Understand basic networking terminology and components
  - Work with binary, decimal, and hexadecimal values.
  - Define a protocol.
  - Define the traditional OSI 7-layer and contemporary Internet 5-layer network models.
  - Understand the difference between packet and circuit switched networks.
  - Compute error-correcting values.
  - Define physical data transport mediums.
  - Identify network hardware, such as routers, switches, bridges, and gateways.
  - Define network topologies.
  - Calculate subnets and supernets in IP-based networks
  - Differentiate a local area network (LAN), metropolitan area network (MAN) and wide-area network (WAN).

*Course Outcome:* Students demonstrate quantitative reasoning skills and critical thinking in the identification and the interpretation of basic networking concepts and their application in modern LAN, MAN, and WAN environments.

2. Exhibit proficiencies in Internet applications
  - Identify common Internet applications and diagnostic tools.
  - Define the use of sockets.
  - Discuss the use of client-side files such as hosts, lmhosts, and services.
  - Define the application of server-side Internet applications.

*Course Outcome:* Students exhibit qualitative and quantitative skills in the use and application Internet applications through written examination and lab exercises.

3. Proficiently design networks conceptually and in a lab environment
  - Implement a network diagram connecting hetero- and homogeneous networks.
  - Configure client and server machines for networking.
  - Design a local area network.

*Course Outcome:* Students demonstrate qualitative and quantitative skills and critical thinking applied to the planning, designing, implementation, and verification of local area networks through models and lab exercises.

## *COURSE OUTCOMES AND ASSESSMENT*

Course objectives are quantitatively and qualitatively measured using the following criterion.

**Course Outcome:** Students demonstrate quantitative reasoning skills and critical thinking in the identification and the interpretation of basic networking concepts and their application in modern LAN, MAN, and WAN environments.

**Assessment:** Students will write scientific papers to report results of assigned research projects. Students will take two examinations during the semester and a final examination to assess comprehension of topics.

**Course Outcome:** Students exhibit qualitative and quantitative skills in the use and application Internet applications through written examination and lab exercises.

**Assessment:** Students identify proper tools and configurations in a lab environment.

**Course Outcome:** Students demonstrate qualitative and quantitative skills and critical thinking applied to the planning, designing, implementation, and verification of local area networks through models and lab exercises.

**Assessment:** Students create conceptual models of networks illustrating devices and physical medium. Critical thinking is assessed by the professionalism of layouts and accuracy of the assignment based on contemporary simulated constraints. Students demonstrate networking skills in a laboratory environment applying techniques discussed in class.

## COMPUTER HARDWARE AND SOFTWARE

The course requires extensive work on IBM compatible computers similar to Cedar Crest College's micro labs located in the basement of the AD building and in Curtis. Labs are available whenever the building is open (and class is not in session in the room) and any computer in any lab or dorm lab may be used providing the necessary software is installed. Assignments must be completed in the specific software package and version discussed in class. Cedar Crest College does not provide software for use on personally owned computers. If the student wishes to purchase the software packages it is the student's responsibility to properly install such software. The instructor, peers, or Cedar Crest representatives are not responsible for supporting individual students' computers. Sharing diskettes for class assignments, sharing network accounts, and copying software are violations of the honor code. Sharing commercial programs is a violation of U.S. copyright laws.

All software used in the course will be available only on the local-area network. All students need to apply for an account to use the LAN and Internet. If you own the software required for the assignment (and the proper version/revision number) you may use it for class assignments. In the event you own a different version or a competitive product, you must obtain permission from the instructor *prior* to beginning your project. For example, Microsoft Excel is the spreadsheet on which Cedar Crest assignments are based. **Using Microsoft Works is not acceptable as its file formats are not compatible with Microsoft Office. Submitting assignments that cannot be opened by the instructor results in a grade of zero for that assignment.** Under no circumstances are you permitted to copy software from the Cedar Crest Labs for use at home.

**Note: Saving work on the public hard disks (C:, desktop, "My Documents", etc.) is not advisable because there is no security on the local machines and your work may be deleted at any time. Work lost on the network disk may be recovered, in some instances, and Computing Services should be contacted immediately to schedule potential recovery. You should always backup (keep two copies) your work.**

## CCC HONOR CODE

Please be reminded of Cedar Crest College's Honor Philosophy during this course. The Honor Code applies to and is not limited to class assignments and examinations.

*I fully support the Cedar Crest College Honor Code and the Classroom Protocol code as stated in the Customs Book.*

## CCC POLICY FOR LEARNING DISABILITIES

Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

## CCC LAB ASSISTANTS AND TUTORS

A lab assistant is assigned to do hardware and software maintenance at each dorm lab, and her name and room number are posted in the dorm. Additionally, there is a lab assistant on duty to provide more extensive help at the central site most days, evenings and weekends. They are trained to handle questions but are instructed not to provide help which would violate the honor code. **THE LAB ASSISTANTS ARE NOT RESPONSIBLE FOR ANY OF YOUR COMPUTER WORK; YOU SHOULD NOT EXPECT THEM TO TUTOR YOU OR MAKE UP FOR MISSED CLASS TIME OR POOR NOTES.** Specifics will be discussed in class. Hours and pictures are posted in Lab 1.

The Cedar Crest computer labs are at all times a work area and not an entertainment area. It is absolutely essential that all students find a comfortable, quiet atmosphere conducive to work. Violations in the form of loud, disruptive behavior of any kind will not be tolerated and will be handled according to established policy.

Tutors are available for most course offerings at Cedar Crest. *Tutors should be not relied upon to complete assignments.* Tutors should offer assistance when the student cannot resolve a particular difficulty. Students should attempt to the best of their ability to work through difficulties encountered. In this way the students' problem solving skills will be sharpened for post-academic employment.

## ASSIGNMENTS

All assignments shall use the DROPBOX feature on the eCompanion site. This is found at <http://www.cedarcrestonline.net>. Printouts, where applicable, may be submitted in class. Email or hand-delivered assignments do not process through the DROPBOX and could cause problems with the grade book.

All assignments must adhere to the following specifications:

- Proprietary material **may not** be submitted as part of any course assignment. This is considered plagiarism and could result in severe penalties to the student.
- All course work may be submitted only once. Work will not be regarded.
- All course work, unless designated as a group project, must be completed solely by the student. Sharing of work is considered breach of the Honor Philosophy.
- Handwritten assignments will be accepted (where applicable); however, it is the student's responsibility to verify the writing is legible or point deductions may occur.
- The tone of writing within documents submitted must be scholarly in nature and language.
- Writing style when submitting research papers must adhere to MLA guidelines.
- It is your responsibility to secure your work from unauthorized duplication and taking precautionary steps to avoid corruption of your work.

If an assignment is not completed and turned in on the due date, five percent of the total value of the assignment value will be deducted PER DAY AFTER THE DUE DATE THAT I DO NOT HAVE THE ASSIGNMENT – NO EXCEPTIONS. If an assignment is handed in late it should be submitted into the DROPBOX or emailed for prompt reception of credit. Late assignments will be graded when the instructor *receives* them—not based on a date written by the student. If a student wishes to receive credit based on the date submitted, the assignment must be accompanied with a date and signature of the department secretary. Late assignments will be returned after on-time assignments are graded.

All work returned and graded you are encouraged to keep for reference. Your instructor will attempt to return the graded work by the next class. Assignments represent a high percentage of your grade. The student who is not willing to give a commitment of time and energy to the computer will almost certainly fail. Projects for this class will require a substantial dedication of time.

All assignments are designed for the average student's ability. The instructor will provide assistance in the event a student has difficulties with assignments. The degree of assistance and when the assistance occurs is at the sole discretion of the instructor. It is not the responsibility of the instructor, tutors, or peers to supply specific formulae or source code. Students must plan their time judiciously. It is the student's responsibility if assistance cannot be granted before the due date of an assignment causing late penalties to be incurred because of poor time management.

All assignments must adhere to the standards set forth by user interface design. Most of these are explicitly described in class while others will be implied based on related topics. These standards are *cumulative* throughout the course and the student must implement these. Failure results in point deductions on these assignments.

## CLASS ATTENDANCE

Attendance at all classes is highly recommended, as we are covering an extensive amount of material which may seem disjointed and overwhelming without the continuity of classroom discussions. Some classroom discussions will require a "hands-on" approach and some will discuss material not covered in the text. While handouts will be provided, you will be responsible for the materials in the text and discussed in class.

If a student cannot attend a class meeting, it is solely the student's responsibility to complete all assignments by the designated due date using electronic mail, inter-office mail, hand-delivery, etc. Likewise it is the student's responsibility to obtain any course notes and information discussed in class. If handouts were provided the instructor will maintain copies for the student during the absence. *The instructor is not required to maintain or give details to a student of any material discussed in class. Likewise, students are not permitted to borrow or view the instructor's materials not designated for class use for any reason.*

Almost all computer assignments will be discussed in some detail in class and some may be modified, so your constant attention is required. Statistics on students who have been unable to motivate themselves to attend this class are dismal, but very revealing.

### EXAMINATIONS

Attendance is mandatory on the exam dates listed on the syllabus. Failure to notify the instructor IN ADVANCE and produce a documented excuse will result in a grade of 0 for that exam.

Examinations are designed to assess the student's knowledge in the subject matter. This includes the ability to apply and critically think through problems. Therefore examinations will include questions based on application of theories. Wrote memorization will not constitute 100% of any examination. Technology changes at an extremely rapid pace and the ability to apply knowledge is critical to future success and exceeding expectations in the workplace.

The class meeting before an exam will have some time allotted for review. The review clarifies any questions the students may have based on materials to be included on the exam. The student should take careful notes during the semester as the exams focus on materials discussed in the classroom.

### OFFICE HOURS

I will be available in my office in Curtis 204 or in the lab during this time or location and times may be scheduled by appointment. Office hours are provided on a first-come first-served basis unless previously scheduled. Please note that office hours are not a substitute for tutoring and this time should not be regarded as personal tutoring time. In this way all students will have potentially equal access to the instructor of this course.

*Students should be considerate and not interrupt an existing session the instructor is leading while awaiting their time slice. Likewise, students should not attempt to impose deadlines on tutors, the instructor, or peers if assistance is desired.*

Wednesday: 6:00 pm-7:00 pm

email: [trmarasc@cedarcrest.edu](mailto:trmarasc@cedarcrest.edu)

Phone: 610/437-4471

Course Web Page: <http://www.cedarcrestonline.net>

### COURSE REQUIREMENTS AND GRADING

One Exam (100 pts)	33.3%	A:	279	C+:	231
Final Exam (100 pts)	33.3%	A-:	270	C:	219
Projects (100 total)	33.3%	B+:	261	C-:	213
		B:	249	D+:	201
Total – 300 pts.	100%	B-:	240	D:	180

No extra credit will be awarded in this class.

**SYLLABUS\***

Week Of	Lecture Topics [Tab-Color Page Range]	Assignments (Due Date)
Jan 21	Number Systems Computer Networks and the Internet [1-37]	
Jan 28	Computer Networks and the Internet [37-80] Number Systems	
Feb 4	Application Layer [80-115]	
Feb 11	Application Layer [115-158]	Project I
Feb 18	Application Layer [158-194] Transport Layer [195-213]	
Feb 25	Transport Layer [214-308]	
Mar 4	Exam I Network Layer [309-371]	
Mar 11	SPRING BREAK—NO CLASS	
Mar 18	Network Layer [371-434]	
Mar 25	Link Layer and Local Area Networks [435-463]	Project II
Apr 1	Link Layer and Local Area Networks [463-487]	
Apr 8	Link Layer and Local Area Networks [487-512]	
Apr 15	Wireless and Mobile Networks [513-588]	
Apr 22	Multimedia Networking [589-678]	Project III
Apr 29	Security in Computer Networks [679-756] Network Management [757-790]	
TBA	Final Exam	

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\* Dates subject to change