

# CPSC 5157G – Computer Networks Fall 2014 (Online and Onsite)

## Instructor

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**Office Hours: MTWR: 5:00pm-7:30pm**

## Class Meetings:

Onsite student: TBA

## Course Prerequisites

A knowledge of Data Structures covered in CPSC 2108.

**Textbook:** Computer Networking: A Top-Down Approach  
6<sup>th</sup> Edition  
James F. Kurose & Keith W. Ross  
Pearson / Addison-Wesley, © 2011.  
ISBN-10            0 – 13 – 285620 – 4  
ISBN-13    978 – 0 – 13 – 285620 – 1

**Other Required Materials:** The student will be required to download and use a number of freeware computer tools, such as Ethereal (Wireshark).

## Additional textbooks and References

1. Andrew S. Tanenbaum , Computer Networks, Prentice Hall.
2. W. Stallings. Data and Computer Communications. Prentice Hall.
3. J. Walrand. Communication Networks: First Course. Aksen Associates.
4. D. Comer. Internetworking with TCP/IP, Volume I, Prentice Hall.
5. W. Stevens. TCP/IP Illustrated: The Protocols, Vol 1. Addison-Wesley.
6. D. Comer. Computer Networks and Internets. Prentice Hall.
7. L. Peterson and B. Davie. Computer Networks: A Systems Approach. Morgan Kaufman.

## Course Catalog Description:

Local area networks, wide area networks, and internets. Protocols and the ISO Open Systems Interconnect reference model. Design, analysis, and performance evaluation. Emphasis on data link, network, and transport protocols.

**Course Description**

This course is a broad introduction to networking concepts and emphasizes the following:

1. Local area networks, wide area networks, and internets.
2. Protocols and the OSI (Open Systems Interconnect) reference model.
3. Design, analysis, and performance evaluation
4. Wireless and mobile network
5. Network security
6. IPv6

**Course Topics**

1. The large-scale structure of the global Internet and its associated protocols;
2. The OSI Reference Model and the Internet Protocol Stack;
3. The Application Layer: Structure and sample applications;
4. The Transport Layer: Its function and services;
5. Reliable data transport and congestion control;
6. The uses of UDP and TCP; the trade-offs between them;
7. The Network Layer: Its function and services;
8. The structure of IP addresses: classful and classless addresses;
9. The DNS (Domain Name Service): “User friendly” names & IP addresses;
10. Routing on the Internet;
11. The Link Layer: Its function and services;
12. Error detection and correction techniques;
13. Collision detection and the Ethernet solution to that problem;
14. Collision avoidance and the Token Ring solution to that problem;
15. Link-layer switches: forwarding and filtering;
16. Wireless and mobile network
17. Network security
18. IPv6
19. Network management

**Learning Objectives**

1. Become familiar with layered communication architectures (OSI and TCP/IP).
2. Understand the client/server model and key application layer protocols.
3. Learn sockets programming and how to implement client/server programs.
4. Understand the concepts of reliable data transfer and how TCP implements these concepts.
5. Know the principles of congestion control and trade-offs in fairness and efficiency.
6. Learn the principles of routing and the semantics and syntax of IP.
7. Understand the basics of error detection including parity, checksums, and CRC.
8. Know the key protocols for multimedia networking including IntServ and DiffServ for IP.
9. Familiarize the student with current topics such as security, network management, sensor networks, and/or other topics.

10. Increase the ability to write a report to a project or a hand-on exercise and make a presentation.

### **Learning Outcomes**

Upon successful completion of the courses in this discipline, the student will:

1. Demonstrate oral and written communication skills and increase ability to be effective team members.
  - Strategies:
    - Study of current research topics in computer network
    - Use Wireshark hands-on exercise report writing and presentation
    - Write team project report and make a presentation
    - Summarize research paper in computer network and make a presentation
  - ABET Criteria: A, B, C, F, I, and J
  - CS Program Objectives: 2, 3, and 4
  - Assessment: Project, hands-exercise report writing, research paper summary, oral presentation.
2. Demonstrate the basic knowledge of intranet, internet, and the Internet.
  - Strategies:
    - Study chapter 1 of the textbook
    - Conduct hands-on exercise to design a and set up a local area network
    - Exercise tools to explore intranet and the Internet infrastructure
  - ABET Criteria: A, B, and C
  - CS Program Objectives: 2, 3
  - Assessment: Written assignment, Hands-on lab report, quiz, and network online tools practicing report
3. Demonstrate the knowledge of computer network programming, such as socket programming.
  - Strategies:
    - Study chapter 2, and 3 of the textbook
    - Conduct hands-on socket programming on TCP and UDP
    - Exercise Wireshark hands-on lab
  - ABET Criteria: A, B, C, I and J
  - CS Program Objectives: 2, 3
  - Assessment: Programming assignment, Programming Project, Hands-on labs

4. Demonstrate the understanding of internet model, or OSI model and the TCP/IP protocol suit.
  - Strategies:
    - Study chapter 2, 3, 4, 5
    - Use Wireshark hands-on labs
    - Learn network online tools
    - Conduct computer network projects
    - Read some TCP/IP related research papers
    - Read protocol-related RFC files
  - ABET Criteria: A, B, C, E, I, J, and K
  - CS Program Objectives: 2, 3
  - Assessment: Writing assignment, project, exam, hands-on labs
  
5. Demonstrate the ability to apply computer network knowledge to solving a real world application.
  - Strategies:
    - Study one of two of chapter 6, 7, 8, 9 of the textbook
    - Conduct a comprehensive project
    - Conduct a short term internship if possible
    - Conduct a field trip to local IT company, campus IT center
  - ABET Criteria: A, B, C, D, E, F, I, J, and K
  - CS Program Objectives: 1, 2, 3, 4
  - Assessment: Project report, presentation, internship report, or field trip report.

### **Course Methods**

1. The class will be a lecture course, taught online through D2L.
2. Laboratory experiences will be part of the course.
3. Students will be expected to complete hands-on exercises and a series of programming assignments.

### **Student Responsibilities**

1. Attend class regularly (if so enrolled) and participate in all online discussions.
2. Complete all reading assignments and all homework assignments.
3. Ask the instructor questions.
4. Send the instructor e-mail with both comments and questions.

### **Instructor Responsibilities**

1. Give lectures on the course material.
2. Assign appropriate homework that illustrates the concepts of the course, and grade and return the homework in a timely manner with adequate explanation.
3. Give tests over the material and grade and return the tests in a timely manner
4. Provide a website that supports the course.
5. Provide at least four hours of office time primarily designated for assistance of students in this class, at times expected to be convenient for the students. It is

expected that the instructor be available to the students during these hours.

6. Reply promptly (within one business day) to all student e-mail communications.

### Methods for Evaluating Students

The evaluation methods will include homework and a comprehensive final exam. In addition there is a “class participation” component to the grade.

Assignments	30%	
Hands-on labs	20%	
Programming Project	20%	
Final Exam	30%	When scheduled by the University Registrar.

**The Exams:** All exams will be given in class. They may be either open-book or closed-book, depending on the context. The time allocated will be the standard.

The Mid-Term Exam will be a one-hour exam.

The Final Exam will be a two-hour exam.

### Assignment of Letter Grades

The method of assigning letter grades based on overall course averages is fairly standard. The basic method for assigning grades is described as follows:

Average	Letter Grade
90 – 100	A
80 – 89	B
70 – 79	C
60-69	D
Below 60	F

### Tentative Topic Schedule (online and onsite)

(the due date is tentative and subject to change. For exact due date and time, please check D2L)

Weeks	Topics to be covered	Asgn	Lab	Project
1 (August 18 – 24 )	<ul style="list-style-type: none"> <li>Introduction to the class</li> <li>Ch1: Introduction to computer networks (review)</li> </ul>			
2 (August 25 – 31)	Ch2: Application Layer (review)			
3 (September 2 – 7)	Ch3: Transport Layer (review)	A1(ch1-3)	Lab 1-HTTP, DNS	
4 (September 8 – 14)	Ch4: Network Layer (review)			
5 (September 15 – 21)	Ch5: Data link Layer (review)	A2(ch4-5)		
6 (September 22 – 28)	Ch6: Wireless mobile network		Lab 2-TCP, UDP and IP	

7 (Sep. 29 – Oct. 5)	Ch6: Wireless mobile network	A3 (ch6)		program ming project- Socket program ming
8 (October 6 – 12)	Ch7: IPv6			
9 (October 13 – 19)	<b>Oct. 13-14: Fall break</b> Ch7: IPv6			
10 (October 20 – 26)	Ch7: IPv6	A4(ch7 )		
11 (Oct. 27 – Nov.2)	Ch8: Security in Networks			
12 (November 3 – 9)	Ch8: Security in Networks			
13 (November 10 – 16)	Ch8: Security in Networks	A5(ch8 )	Lab 3- Security	
14 (November 17 – 23)	Ch9: Network Management			
15 (November 24 – 30)	<b>Thanksgiving break!</b>			
16 (December 1 – 7)	Ch9: Network Management	A6 (ch9)		

### Course Assistance

Student assistants in the Computer Center can help you with basic computer-related problems (such as logging on to the network, saving your work, etc.), but they are not trained to help you with your assignments. We have several tutors at the Department of Computer Science who can help you with programming assignments. Their schedule is posted at the department office. You can always contact me during the posted office hours or by appointment. The best way to get in touch with me is by e-mail at **[yang\\_jianhua@columbusstate.edu](mailto:yang_jianhua@columbusstate.edu)**.

### Dropping the Course

We hope that you will complete the course and profit from it. If it is necessary for you to withdraw from the course during the semester, you must follow all official CSU procedures for withdrawing. It is not sufficient to notify the instructor; you must use the ISIS system and withdraw officially. For details on how to withdraw from a course, see the web page

<http://aa.columbusstate.edu/advising/w.htm#Withdrawal%20from%20a%20Course>.

I would appreciate it if you were first to consult with me before starting the procedure for withdrawing from the course. In some cases, we can agree on an arrangement that will allow you to complete the course with minor adjustments.

### Academic Honesty

Academic dishonesty includes, but is not limited to, activities such as cheating and plagiarism ([http://aa.columbusstate.edu/advising/a.htm#Academic Dishonesty/Academic Misconduct](http://aa.columbusstate.edu/advising/a.htm#Academic%20Dishonesty/Academic%20Misconduct)). It is a basis for disciplinary action. Any work turned in for individual credit must be entirely the work of the student submitting the work. All work must be your own. You may share ideas but submitting identical assignments (for example) will be considered cheating. You may discuss the material in the course and help one another with debugging; however, any work you hand in for a grade must be your own. A simple way to avoid inadvertent plagiarism is to talk about the assignments, but don't read each other's work or write solutions together unless otherwise directed. For your own protection, keep scratch paper and old versions of assignments to establish ownership, until after the assignment has been graded and returned to you. If you have any questions about this, please see me immediately. For assignments, access to notes, the course textbooks, books and other publications is allowed. All work that is not your own, **MUST** be properly cited. This includes any material found on the Internet. Stealing or giving or receiving any code, diagrams, drawings, text or designs from another person (CSU or non-CSU, including the Internet) is not allowed. Having access to another person's work on the computer system or giving access to your work to another person is not allowed. It is your responsibility to keep your work confidential.

No cheating in any form will be tolerated. Penalties for academic dishonesty may include a zero grade on the assignment or exam/quiz, a failing grade for the course, suspension from the Computer Science program, and dismissal from the program. All instances of cheating will be documented in writing with a copy placed in the Department's files. Students will be expected to discuss the academic misconduct with the faculty member and the chairperson. For more details see the Faculty Handbook: <http://aa.columbusstate.edu/faculty/FacHandbook0203/sec100.htm#109.14> and the Student Handbook: <http://sa.columbusstate.edu/handbook/handbook2003.pdf>

### ADA Accommodation Notice

*If you have a documented disability as described by the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, Section 504, you may be eligible to receive accommodations to assist in programmatic and/or physical accessibility. We recommend that you contact the Office of Disability Services located in Schuster Student Success Center, room 221, 706-507-8755 as soon as possible. The Office of Disability Services can assist you in formulating a reasonable accommodation plan and in providing support. Course requirements will not be waived but accommodations may be able to assist you to meet the requirements. Technical support may also be available to meet your specific need*

Course requirements will not be waived, but reasonable accommodations may be provided as appropriate. **It is then your responsibility to contact and meet with the instructor. It is also your responsibility to present the instructor with a letter from the Center for Academic Support. Without this letter detailing the required accommodations, the instructor cannot help you.** The Center for Academic Support can assist you and the instructor in formulating a reasonable accommodation plan and

provide support in developing appropriate accommodations for your disability. Course requirements will not be waived but accommodations may be made to assist you to meet the requirements. Technical support may also be available to meet your specific need.

For more information on services and support available, refer to

[http://uc.columbusstate.edu/disability\\_services.htm](http://uc.columbusstate.edu/disability_services.htm).

**CS Program Objectives:**

Our graduates will have achieved:

- 1) a broad general education assuring an adequate foundation in science and mathematics relevant to computing.
- 2) a solid understanding of concepts fundamental to the discipline of computer science.
- 3) good analytic, design, and implementation skills required to formulate and solve computing problems.
- 4) the ability to function and communicate effectively as ethically and social responsible computer science professionals.