CIS 410 – Computer Networks
Spring 2023

Textbook Required: *Computer Networking: A Top-Down Approach (7th or 8th Edition),*
By James Kurose & Keith Ross
ISBN-13: 978-0133594140 ISBN-10: 0133594149

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Office Hours: MW - 10:00am - 12:00 noon
Tu Th - 11:00am to 12:00 noon

Class Time/Place: Tu Th – 8:00 am to 9:15 am, Dunn Hall 204

Final Exam: Friday, May 19, 10:15 a.m. – 12:15 p.m.

Learning Objectives:

This course begins with an examination of how information travels on a digital network; the important concept of operational layers is introduced to overcome the inherent complexity in communication among multiple programs on multiple platforms across multiple communications media. This course also takes a low-level look at inter-process communication (IPC) and how multiple separate processes can collaborate in a single computation. We will investigate different communication patterns (peer-to-peer, client/server, remote procedure call) and consider how they are implemented.

Upon finishing this course, students should be able to:

1. Define layered communication architectures (OSI and TCP/IP).
2. Define client/server model and important application layer protocols.
3. Learn sockets programming and be able to implement client/server programs.
4. Learn the concepts of reliable data transfer and its implementation in the TCP layer.
5. Learn the principles of congestion control and the trade-offs in fairness and efficiency.
6. Learn the principles of forwarding and routing in traditional networks and software designed networks.
7. Learn error detection and correction techniques.
8. Learn the principles of network security.

Tentative Schedule:

Weeks	Topics	Assignments
Week 1	Chapter 1 – Computer Networks and the Internet What Is the Internet? The Network Edge The Network Core	
Week 2	A Network of Networks Delay, Loss, and Throughput in Packet-Switched Networks Protocol Layers and Their Service Models Networks Under Attack	Homework 1
Week 3	Chapter 2 - Application Layer Principles of Network Applications The Web and HTTP File Transfer: FTP Electronic Mail in the Internet	
Week 4	DNS—The Internet's Directory Service Peer-to-Peer Applications Socket Programming: Creating Network Applications	Homework 2
Week 5	Midterm 1 Chapter 3 Transport Layer Introduction and Transport-Layer Services Multiplexing and Demultiplexing	
Week 6	Connectionless Transport: UDP Principles of Reliable Data Transfer Connection-Oriented Transport: TCP	
Week 7	Principles of Congestion Control TCP Congestion Control	Homework 3
Week 8	Chapter 4 The Network Layer Data Plane Introduction Virtual Circuit and Datagram Networks What's Inside a Router?	
Week 9	Generalized forwarding and SDN Chapter 5 The Network Layer Control plane The Internet Protocol (IP): Forwarding and Addressing in the Internet Routing Algorithms	Homework 4
Week 10	Routing in the Internet Intra-AS Routing in the Internet: RIP Intra-AS Routing in the Internet: OSPF	
Week 11	Inter-AS Routing: BGP Broadcast and Multicast Routing Chapter 6 The Link Layer: Links, Access Networks, and LANs Introduction to the Link Layer Error-Detection and -Correction Techniques	Homework 5

Week 12	Multiple Access Links and Protocols Switched Local Area Networks Link Virtualization: A Network as a Link Layer	
Week 13	Data Center Networking Retrospective: A Day in the Life of a Web Page Request Midterm 2	Homework 6
Week 14	Chapter 8 Security in Computer Networks What Is Network Security? Principles of Cryptography Symmetric Key Cryptography Public Key Encryption Message Integrity and Digital Signatures	
Week 15	End-Point Authentication Securing E-Mail Securing TCP Connections: SSL Network-Layer Security: IPsec and Virtual Private Networks Securing Wireless LANs Operational Security: Firewalls and Intrusion Detection Systems	Homework 7
Week 16	Review and Final exam	

Grading for the Course:

1. ***Weekly Quizzes:*** 10 %

   A ten-minute weekly quiz will be given once a week. It can be on any class day. It will be based on lectures and Homework problems assigned for you. There is no make-up quiz.

2. ***Homeworks:*** 15 %

   Several homeworks will be given based on the concepts discussed in lectures. These homeworks will be the essential part of the course. HWs will be posted on moodle page along with the due date. Late work is penalized at 20% per calendar day that they are late. No late work is accepted beyond the cutoff date. Your final submitted HW should represent your individual work; it is, however, acceptable to discuss the solution approach with other students. You will be responsible for keeping track of due dates posted on moodle.

3. ***Exams:*** 50%

   a. Midterm 1 – 16 %
   b. Midterm 2 – 16 %
   c. Final Exam – 18 %

Exams will be closed book and closed notes unless specified otherwise. Any request for re-grading must be received in writing and within 3 days of receiving your graded exam back. Prior notice must be given to your instructor. No make-ups will be granted unless satisfactory documentation is produced to show an extenuating circumstance.

4. ***labs & programming Assignments:*** 25%

- There is no laboratory section for this course; students must, with a spirit of independence and experimentation, continue their learning outside the classroom.
- We will be using wireshark platform for some hands on experiments in this course.
- Students write a large number of networked computer programs in Java. Programs introduce sockets, TCP and UDP packets, encryption, and routing algorithms. Final grades are determined using a class curve of the course-grade averages.

Course Policies

1. **Late work**

   All due dates for the course will be strictly enforced. Prior approval will be required from the instructor for any late submission, including making up missed exams.

2. **Attendance**

   Attending all lectures and labs and completing required work is crucial to your success in this course. While attendance is not graded *per se,* in-class graded work cannot be made up without prior arrangement with the instructor. In the event of absences from weekly labs, you are required to complete the missed lab work before the beginning of the next lab session. The instructor and CS tutors will be available to help you with completing labs during posted office and tutoring hours.

3. **Absences**

   As noted above, in-class graded work cannot be made up without prior arrangement with the instructor.

   Accommodation of Religious Observances: I will make reasonable accommodation for a student's religious beliefs. Please notify me within the first week of classes about any scheduled class date that conflicts with a religious observance.

4. **Academic Integrity**

   You are expected follow the "SUNY Potsdam Academic Honor Code" (SUNY Potsdam Undergraduate Catalog, https://catalog.potsdam.edu/content.php?catoid=7&navoid=566) by doing your own work on all required work for the course unless specifically directed otherwise by the professor. **Copying is strictly forbidden, regardless of the source** (online, other students). Students caught cheating will receive a grade of 0 for that evaluation. More than one offense will result in dismissal from the course and possible disciplinary sanctions by the university. Academic Misconduct definitions, procedures, due process, and student rights are described on page in the SUNY Potsdam Undergraduate Catalog, as cited above.

5. Grade Distribution

At the end of the semester, I will calculate what fraction of the possible points you have earned, and your grade will be based on this distribution:

4.0: 95 – 100%
3.7: 90 – 94%
3.3: 85 – 89%
3.0: 80 – 84%
2.7: 77 – 79%
2.3: 73 – 76%
2.0: 70 – 72%
1.7: 67 – 69%
1.3: 63 – 66%
1.0: 60 – 62%
0.0: <60%

Note that final grades may be determined using a class curve of the course-grade averages.