

Computer Networks Fundamentals

CNT 4007 C

Class Periods: Tuesday 1:55-2:45pm, Thursday 1:55-3:50pm

Location: Classroom location CSE A101

Academic Term: Fall 2019

Instructor:

Name: Ahmed Helmy

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Office Phone Number: (352) 294-6652

Office Hours: Tuesdays & Thursdays, 10:30-11:30am, office location E426 (CSE bldg., CISE Dept)

Website: <https://www.cise.ufl.edu/~helmy>

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- Victoria Crawford, email: vcrawford01@ufl.edu, office location: E309 (or if not available E347), office hours: Mondays 10:00-11:30am, Wednesdays 1:00-2:30pm

Course Description

Fundamental concepts, principles and standards of computer networks. Topics are introduced in bottom-up approach, starting from physical layer in OSI system architecture with a stronger focus on data link, mac, network and transport layers. **Credits and contact hours:** 4 credits; 3 classes per week of 50 minutes each

Course Pre-Requisites / Co-Requisites

Prereq: COP 4600 (Operating Systems)

Note: Familiarity is expected of the following subjects: data structures and algorithms, computer organization, and operating systems. At the undergraduate level this is equivalent to COP 3530 (data structures and algorithms), CDA 3101 (introduction to computer organization) and COP 4600 (operating systems). Students should also be familiar with elementary graph theory and basic probability. Students should have the ability to write simple programs in Java, C, or Python.

Course Objectives

This course focuses on the concepts and fundamental design principles that have contributed to the global Internet's scalability and robustness. Students will learn about communication networks in general, the internals of the Internet, its layers, and network programming. They will learn major protocols, algorithms and network components, e.g., HTTP, DNS, TCP/IP protocols, Ethernet, and routers. More generally, they will learn how to design and engineer large distributed networked computer systems.

Brief list of topics to be covered

- a. Protocol layering: application, transport, network and link layers,
- b. Protocols: HTTP, DNS, TCP/IP, Ethernet,
- c. Concepts: congestion control and flow control, reliable data transfer principle and protocols,
- d. Topics and network architecture: TCP congestion control and reliability, addressing, internetworking, and multicast, routing algorithms and protocols, including BGP, RIP, and OSPF
- e. Technologies: wireless networks, mobile networks, and peer-to-peer networks,
- f. Tools: performance evaluation, measurement and analysis

Required Textbooks

- Title: *Computer Networking: A Top-Down Approach*
- Authors: J. Kurose and K. Ross
- Publication date and edition: 7th edition, Pearson, 2017 (6th edition OK, but chapter numbers may differ)
- ISBN number: 978-0-13-359414-0

[Note: some extra notes may be included in the lecture slides/notes and discussed in class. Those notes should be available through e-learning (Canvas) at UF.]

Course Schedule

Week 1:	Syllabus, course layout, Intro to the Internet architecture (Ch 1)
Week 2:	Network Edge, links and core, layering, multiplexing (circuit vs packet) (Ch 1)
Week 3:	Intro to network analysis, security (Ch 1), Intro to application layer (Ch 2)
Week 4:	Application layer, protocols, socket programming, HTTP, SMTP, DNS (Ch 2)
Week 5:	Peer-to-peer (p2p) networks & analysis (Ch 2), Intro to transport layer (Ch 3)
Week 6:	TCP protocol, congestion control, flow control and windowing schemes (Ch 3)
Week 7:	Window management and slow start mechanisms (Ch 3)
Week 8:	Review and midterm week
Week 9:	Data-link layer, medium access control (MAC) algorithms (Ch 6)
Week 10:	MAC analysis, CSMA, CSMA/CD, Ethernet (Ch 6)
Week 11:	Wireless and mobile networking, 802.11, CSMA/CA (Ch 7)
Week 12:	Cellular networks, TDMA, CDMA (Ch 7)
Week 13:	Network layer and unicast/shortest path routing algorithms (Dijkstra's, Bellman-Ford) (Ch 5)
Week 14:	Routing protocols (RIP, OSPF), and multicast routing (DVMRP, PIM-SM) (Ch 5)
Week 15:	Review

Final Exam: 12/11/2019 @ 10:00 AM - 12:00 PM

[Note: the above schedule is subject to change due to unexpected delays, storms, campus closures, holidays]

Make-Up Policy

Requests for make-up will only be allowed in very limited extraordinary circumstances, and only after getting approval from the instructor and supporting the request with documents as appropriate

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (4)	100 each	30%
Midterm Exam	100	30%
Final Exam	100	40%
		100%

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](mailto:title-ix@ufl.edu), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.