Computer Communications
EEL4598 Sections: CAMP, OVER (Live/Synchronous)
EEL5718 Sections: CAMP, OVER (Live/Synchronous)
EDGE EEL5718 Sections: 1FE2, 2FED (Asynchronous)

Class Periods: Tuesday, Period 4 (10:40am-11:30am)
Thursday, Periods 4-5 (10:40am-12:35pm)
Location: NEB 202
Academic Term: Fall 2024

Instructor:
Name: Professor Janise McNair
Email Address: mcnair@ece.ufl.edu (After classes begin, please use Canvas mail tool.)
Office Phone Number: 352-392-2629
Office Hours: Wednesdays, 1pm-2pm

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Name: Quadri Abiru
Email Address: Please use Canvas mail tool.
Office Hours: TBA (See Canvas course site)

Course Description
This course introduces the principles and practice of computer networking, emphasizing data communication and the lower layers of the OSI and TCP/IP protocol architectures. Explores the design of data communication networks: modems, terminals, error control, multiplexing, message switching, and data concentration. (3 credits)

Course Pre-Requisites / Co-Requisites
EEL4598 Pre-req: EEL 3834 or COP 3503C or COP 3504C or COP 2274 or equivalent, all with minimum grades C and junior standing or higher

EEL5718 Pre-req: Communication Systems and Components or equivalent and graduate level standing. Students may not take this course if they have already taken EEL4598.

Course Objectives
Computer communications networks are the key infrastructures of today's information society. They contribute to the correct operations of many critical services (from healthcare to finance to transportation to power to entertainment). A computer communication network consists of a set of equipment, facilities, architectures and protocols that enable the transfer of information between two or more chips, devices, machines and/or users.

In this course, students will learn about the basic operation and design of various computer communications systems. The students will apply their knowledge of advanced mathematics, basic programming, and communications systems to understand and evaluate the performance of modern and next generation computer communication networks.
These objectives will be accomplished through:
1. Examining the operation of networks for services, such as transport of voice, data, image, and video.
2. Designing and conducting experiments using professional computer engineering industry tools
3. Applying mathematics (including probability and statistics, discrete math) and engineering to evaluate performance and compare networked systems.
4. Developing techniques and skills necessary for applying computer communications in practice.

Materials and Supply Fees
None

EEL4598: Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	Medium
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	High
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

Required Textbooks and Software

- Leon-Garcia and I. Widjaja, Communication Networks, McGraw-Hill, 2nd edition, 2003.
  ISBN number: ISBN-10: 007246352X or ISBN-13: 978-007246352
- The textbook is from 2003, but it has good fundamentals discussions. It will be supplemented with up-to-date IEEE and ACM articles, talks and book chapters. Access to articles and chapters will be provided through the UF Library and posted in Canvas.

Recommended Materials - N/A

Required Computer
UF student computing requirement: *https://news.it.ufl.edu/education/student-computing-requirements-for-uf/*
Course computing requirement:
- Open-source software will be used for simulator/emulator assignments. Every student must have a computer where you can install and use the software.
- For EEL5718, your computer must be able to support virtual machines to run project simulations.
- CAMPUS section students: Homework quizzes will be given in class but will be on Canvas.
- EDGE Students: Homework quizzes and the Midterm Exam will be on Canvas using Honorlock.
  - Honorlock requires access to your computer for online proctoring during the quiz or exam.
  - Honorlock Guidelines can be found in the course Canvas site, under Files/Honorlock

Course Schedule

Update schedule – Sept 9, 2024 (changes in topics and assignments marked in red)

Week 1	Course Overview, Communication Networks and Layers	Leon-Garcia Chaps 1,2	
Week 2	Layers and Links	Leon-Garcia Sects 7.1-7.3	~~Lab 0~~
Week 3	IP Protocol and IP Addresses	Leon-Garcia Sects 8.1-8.2	HW 1 Quiz
Week 4	~~Transmission Media~~ Digital Transmission Fundamentals	Leon-Garcia Section 3.1-3.3, 3.5	~~Lab 1~~ → Lab 0
Week 5	~~Error Characterization, BER, PER~~ Line Coding and Modulation	Leon-Garcia Sections 3.6,3.7	HW 2 Quiz
Week 6	~~Error Control Coding, Parity, CRC~~ Error Characterization, BER, PER	Leon-Garcia, Sections 3.9	~~Lab 2~~ → Lab 1
Week 7	~~MAC Protocols, LANs and Ethernet~~ Error Control Coding, Parity, CRC	Leon-Garcia, Sections 3.9	HW3 Quiz
Week 8	Peer-to-Peer Protocols and ARQ	Leon-Garcia, Sections 5.1-5.3	Lab 2
Week 9	*~~Review and Midterm Exam~~* ARQ Protocols	Leon-Garcia, Sections 5.1-5.3	HW 4 – No Quiz
Week 10	~~Internet Protocol~~ *Review and Midterm Exam*		Midterm Exam
Week 11	IP Address Exhaustion and IP Routers	Leon-Garcia, Sections 8.1-8.2	
Week 12	Routing Protocols	Leon-Garcia, Section 7.4	HW5 Quiz
Week 13	Software-Defined Networks	Supplemental Research Papers	
Week 14	TCP Slow Start and Congestion Control	Leon-Garcia, Sections 8.5	Progress Report
Week 15	Project Work and Thanksgiving Holiday	Course Project Assignment	
Week 16	Demonstration Week	Course Project Assignment	Demonstrations and Report

EDGE Classroom This course has an EDGE (distance-learning) section. The class will consist of pre-recorded lecture modules, followed by in-class problem discussion sections that will be live (hybrid classroom and zoom). The sessions will be recorded and posted in Canvas in the Modules section. This class requires students to have access to a working webcam and stable internet connection.

Attendance Policy, Class Expectations, and Make-Up Policy
Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
- Undergraduate Students: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/
- Graduate Students: https://gradcatalog.ufl.edu/graduate/regulations/
- For students enrolled in *Section CAMP (5718 or 4598),* **the midterm exam must be taken in person in the regular classroom or at the DRC office.**
- For students enrolled in the *EDGE sections (Sections 2FED or 1FE2),* the midterm exam can be taken in person or online.
- Deadlines:
   - There will be no make-ups for missed assignments, homework or exams due to **unexcused** absences. Late homework may be accepted before solutions are posted. A 5% daily penalty may be applied.
   - EDGE students will have a one-week automatic extension for all deadlines, except for dates that go beyond the end date of the term. Any exceptions require prior approval by the instructor.

Other Course Policies
- o It is the student's responsibility to **check Canvas and Gatorlink email regularly** for class announcements and updates.
- o **All assignments are assumed to be an individual effort unless otherwise specified by the instructor.**
- o **A class participation grade will be assessed** for each student based on regular (not perfect) participation in class prep quizzes, surveys, discussions. Deductions for disruptive behavior.
- o **Every student will be in a course project group.** It is expected that each student will be responsive to and communicate within their group and will behave responsibly in group participation. A group participation grade will be assessed.
- o **Electronic submission of homework and assignments is required.** Lab demos will be recorded and posted on a cloud site (Youtube, Google, etc.)

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework, Quizzes and Labs	100 each	30%
Class and Group Participation	100	10%
Midterm Exam	100	30%
Project --Demonstration --Final Report	 100 100	 20% 10%
		Total: 100%

Grading Policy

Percent	Grade	Grade Points
91.0 - 100	A	4.00
89.0 - 90.9	A-	3.67
87.0 - 88.9	B+	3.33
80.0 - 86.9	B	3.00
79.0 - 79.9	B-	2.67
77.0 - 78.9	C+	2.33
70.0 - 76.9	C	2.00
69.0 - 69.9	C-	1.67
67.0 - 68.9	D+	1.33
60 - 66.9	D	1.00
59.0 - 59.9	D-	0.67
0 – 58.9	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 who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, 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.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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/process/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 varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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 Undergraduate Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@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:

<u>Health and Wellness</u>

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: https://counseling.ufl.edu, 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**, 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/.

<u>Academic Resources</u>

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://elearning.ufl.edu/.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*: https://distance.ufl.edu/getting-help/; *https://distance.ufl.edu/state-authorization-status/#student-complaint*.