

Wireless Networks

EEL6591: Sections: Online (1FE2, 2FED), Campus

Class Periods: Monday, Wednesday, Friday, Period 4 (10:40 AM - 11:30 AM)

Location: NEB 201

Academic Term: Spring 2020

Instructor

- Name: Dr. Janise McNair
- Email Address: mcnair@ece.ufl.edu (After class begins, please contact using Canvas Inbox.)
- Office Phone Number: 352-392-2629
- Office Hours: Monday and Wednesday 11:30am-1230pm

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- Allen Starke
- Email address: Contact TA role using Canvas Inbox.

Course Description

(3 credits) Design and analysis of wireless networks including channel characteristics, physical layer, cellular concepts, multiple access control protocols, FEC and ARQ protocols, resource allocation, and wireless standards.

Course Pre-Requisites / Co-Requisites

EEL 5718 and knowledge of probability and statistics

Course Objectives

In this course, students will study cellular network evolution up to 5G systems, including cellular network design, creating and analyzing wireless network simulations, and reading/critically evaluating recent research this area.

These objectives will be accomplished through:

1. Discussion of modern and next generation technologies and standards.
2. Designing and conducting experiments with industry-level simulation software
3. Applying mathematics and engineering to evaluate cellular systems with performance metrics
4. Identifying, formulating and solving cellular networks problems
5. Developing and using techniques, skills, and tools necessary for wireless network engineering in practice.

Materials and Supply Fees -- None

Required Textbooks and Software

- Title: Principles of Wireless Access and Localization
 - Authors: K. Pahlavan and P. Krishnamurthy
 - Publication date, edition, and publisher: November 2013, 1st edition, Wiley
 - ISBN number: *ISBN-10:* 0470697083, *ISBN-13:* 978-0470697085
 - Notes:
 - Limited access to the ebook will be available through ARES Course Reserves <https://ares.uflib.ufl.edu/ares/>
 - A 2001 version (same author, different publisher) has about 50% overlap with the 2013 text: K. Pahlavan and P. Krishnamurthy, Principles of Wireless Networks: A Unified Approach. Prentice Hall, December 2001. ISBN-13: 978-0130930033 ISBN-10: 0130930032
- Ns-3 Network Simulator Software
 - You can access ns-3 through the ECE server. Go to <https://www.ece.ufl.edu/resources/it/> Scroll down and click [ECE Student Computing Lab Access and Information](#)
 - You can also download ns-3 to your own computer from here: <https://www.nsnam.org/> (recommend reading instructions in course Canvas page first)

Course Schedule

Week 1: Course Overview, Industry Outlook
Week 2: Part 1: 4G; 4G Cellular Network Architecture
Week 3: Simulating Wireless Networks / Project Introduction
Week 4: Multiple Access in 4G Cellular Networks
Week 5: Frequency Reuse and Network Capacity
Week 6: Mobility Management
Week 7: Midterm Exam
Week 8: Mobility Modeling
Week 9: Spring Break
Week 10: Part 2: 5G; 5G System Architecture
Week 11: Simulating Wireless Networks / Project Update
Week 12: Small Cells
Week 13: Cognitive Radio
Week 14: Non-orthogonal Multiple Access
Week 15: Vertical Mobility
Week 16: Project Demonstrations Week

It is expected that each project group will give at least one in-class presentation during the semester. Schedule to be determined.

Course Policies

- **Assignment Submission.**
 - Electronic submission of homework and project assignments are required.
 - Upload to the course e-learning site in one of the following formats: PDF (preferred), MS Word, or Text
- **Access to a computer programming or simulation tool is required.**
 - Homework, quizzes and assignments may require e-learning, ns-3, Matlab, GENI, or other software.
 - Open source software will be provided for simulator/emulator assignments.
- **Regular Participation is Expected:**
 - Perfect class attendance is not required, but regular participation is expected. Occasional in-class Canvas online quizzes will be given to indicate class participation. An internet-ready cell phone or laptop is required to take the quiz.
 - It is the student's responsibility to independently obtain missed material from class time.
 - Excused absences require proper documentation and must be consistent with the university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).
- **Deadlines:**
 - There will be no make-ups for in-class assignments. Late homework may be accepted before solutions are posted, but a 10% penalty per day may be applied.
 - There will be no make-ups for homework or exams, except for excused absences (as determined by the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>)). Requires proper documentation.
- **Individual Effort**
 - All assignments are assumed to be an individual effort unless otherwise specified by the instructor.
- **Announcements and updates**
 - Each student must link their e-learning Inbox to your gatorlink email to receive regular class updates.
- **Class participation**

A class participation grade is assigned to each student to reflect attendance at student presentations, project group participation, discussion participation, as well as deductions for disruptive behavior, tardiness, etc.

Evaluation of Grades:

Assignment	Percentage of Final Grade
Homework and Simulation Exercises	10%
Midterm Exam	30%
Group Presentations	20%
Course Project(s) (Rubric provided in assignment link)	30%
Group Participation (Peer Evaluation)	5%
Class Participation (In class quizzes)	5%
TOTAL	100%

Grading Policy:

NOTE: This grading scale does not include any curve that may be applied to the course.

Percent	Grade	Grade Points
93 - 100	A	4.00
90 - 92.9	A-	3.67
87 - 89.9	B+	3.33
83 - 86.9	B	3.00
80 - 82.9	B-	2.67
77 - 79.9	C+	2.33
73 - 76.9	C	2.00
70 - 72.9	C-	1.67
67 - 69.9	D+	1.33
63 - 66.9	D	1.00
60 - 62.9	D-	0.67
0 - 59.9	E	0.00

Note that A “C-” will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: A “C-” average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement.

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://disability.ufl.edu/>) 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.ua.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.ua.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 student 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, 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://care.dso.ufl.edu>.

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