

[ECE4607] Syllabus

Mobile and Wireless Networks, 3-0-3

[Fall 2026]

[Days, Time, Location]

Instructor Information

Instructor

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Office Hours & Location

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Teaching Assistant(s)

[TBD]

Email

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Office Hours & Location

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General Information

Description

The objective of this course is to introduce undergraduate students to the basic concepts of mobile and wireless networks. It will cover concepts at various layers of the wireless protocol stack (physical, MAC, network, transport and application) that are responsible for making our mobile networks function effectively and efficiently in the real-world. Beyond a typical lecture format, the course will also introduce students to wireless networking research, involving them in the study and presentation of research articles, as well as introducing them to the initial stages of research on cutting-edge research topics in the field, accompanied by a small hands-on project.

Pre- &/or Co-Requisites

None

Course Goals and Learning Outcomes

Upon successful completion of this course, the student should be able to

1. Describe the various layers of the wireless protocol stack and their functionality
2. Analyze the challenges in designing medium access control solutions for wireless networks
3. Describe the techniques used to provide continuous connectivity during user mobility
4. Describe the challenges in designing and porting higher layer protocols from wired to wireless networks
5. Capable of reading research articles, identifying their core problem and solution, and presenting the work in a comprehensible manner to peers

Course Requirements & Grading

Assignment	Date	Weight (Percentage, points, etc)
Exam 1		25
Exam 2		25
Research paper presentations + quizzes		30
Mini project		15
Peer evaluation & class participation		5

Description of Graded Components

None The exams will typically be an in-person, in-class exam, where students are assessed on their comprehension and mastery of the learned concepts. The exams are complemented by a research component and its assessment. Specifically, a curated set of research papers that complement the course lectures/topics will be provided to introduce students to wireless research. Students will read and present a subset of these papers as a group at various points in the semester, where they will be further discussed by the instructor for the broader understanding of the entire class. The presentations are typically for 15 mins per group. They are often followed by a short multiple-choice quiz that assesses the students on their comprehension of the high-level concepts in the paper. The course will also involve a small project that the students will participate as a group, where they will be guided to conduct limited-scope investigation on a cutting-edge wireless topic relevant to the class.

Course Materials

Course Text

None

Additional Materials/Resources

Research papers will be made available on canvas. Experimental devices as relevant for final projects will be provided.

Course Website and Other Classroom Management Tools

On canvas

Course Topics

OSI Network Protocol Stack

- What is the equivalent for wireless?

Wireless Physical Layer

- Brief introduction
- OFDM, OFDMA, smart antenna techniques

Medium Access Control

- Conventional wired MAC (CSMA/CD)
- Wireless: Asynchronous access (WLANs)
 - o WiFi: CSMA/CD, CSMA/CA - TDMA
 - o BLE: frequency hopping - FDMA
- Wireless: Synchronous access (cellular)
 - o LTE/NR: FFR (TDM+FDMA)

Routing/Mobility

- Wired IP based routing
- Wireless: WLANs, Cellular
 - o Not much work needed for WLANs
 - o Mobile IP for routing in presence of mobility/handoffs
- Wireless: Multi-hop wireless networks
 - o DSR, AoDV

Transport

- Conventional wired TCP
- Limitations of TCP in wireless
- Wireless: Different TCP approaches
 - o Split-TCP, Rate-based (ATP)

Application

- Video over wireless networks
- Localization

Special Topics (as time permits):

- Introduction to 5G wireless, wireless and mobile sensing
- UAV-based autonomous wireless networks

Course Expectations & Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will earn a failing grade for the activity in question on the first offense, and will fail the entire course on the second offense. Further, the student will be reported to the Office of Student Integrity, who will investigate the incident and identify its own appropriate penalty for violations as well.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated [career competencies](#). [This resource](#) developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Attendance and/or Participation

Class attendance is highly recommended as the course content will help the students successfully navigate the graded components of the course, including but not limited to the programming assignments, research paper presentations and the final project. There is also a grading component that relates to student participation in the class lectures as well as the group activities they are assigned.

Collaboration & Group Work

Several of the graded components of this course will involve a group/team effort. While the group will be graded jointly, if there are significant differences in the amount of contribution of the team members, appropriate relative grades will be assigned to different members, which is at the discretion of the instructor. While students are allowed to refer to online resources, articles and project codes for assignments and projects, they should not replicate them as is. Further, they should cite references as appropriate.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

For events that are known ahead of time, for which the student is expected to miss an assignment or exam, it is the responsibility of the student to discuss with the instructor at the semester's start of the course to make alternate arrangements. If circumstances for the lapse are extenuating, alternate arrangements will be considered and decided on a case-by-case basis.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Student Use of Mobile Devices in the Classroom

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone's learning experience if your cell phone, pager, laptop, etc. makes noise or is visually distracting during class. That said, many students find it useful to have a mobile device on hand to access course materials. With this in mind, you are allowed to take notes on your laptop, but request that you turn the sound off so that you do not disrupt other students' learning. With respect to cellphones and smartphones, I request that you silence them and leave them in your bag when the class is in session.