

ECE 564 — Spring 2021

Advanced Topics in Computer Networks

Monday & Wednesday, 3:30–4:45pm (Live Online)

General Information

Instructor Dr. Marwan M. Krunz
ECE Building, Room 365
Email: krunz@arizona.edu.
Office Hours: Wednesday 10–11am and by appointment (Zoom link will be provided)

Class Material

There is no textbook for this class. The material will be covered from:

- **Class notes** — Notes will be provided in several parts, which will be posted on the class D2L page at <https://d2l.arizona.edu> or emailed directly to students.
- **Assigned reading** — Articles from the literature will be assigned throughout the semester. Their titles will be announced in class and posted on the class page. Electronic copies of such articles can often be obtained from the UA Digital Library. Papers not available in the UA Digital Library will be provided on D2L. Reading material will be continuously assigned throughout the semester. Check the class page periodically for the latest assigned reading. *Unless indicated otherwise, you are responsible for the content of all assigned papers.*
- **Standards and specifications, including IETF RFCs, IEEE standards, FCC reports, 3GPP specs, ...**

Prerequisites

- Introductory course to computer networking (e.g., ECE 478/578 or equivalent).
- Introductory upper-level undergraduate course in probability theory and random processes (e.g., ECE 503).

Note: Depending on your background, you may still be allowed to enroll in this class even if you have not taken ECE 578 and ECE 503. However, you must discuss your situation with the instructor and get his permission.

Course Objectives

The goal of this course is to expose students to recent advances in computer networks, with focus on the architectural aspects and protocols. The course will cover a wide range of topics in both wired and wireless networks. For wired networks, covered topics will include: Quality-of-service guarantees for real-time applications, traffic and congestion control mechanisms, voice/video over IP networks, TCP-based flow control, RTP and RTCP protocols, SIP (Session Initiation Protocol), buffer management and priority scheduling at Internet routers, traffic policing, fair allocation of bandwidth resources, teletraffic modeling and characterization, software-defined Networking (SDN),

slicing and network virtualization, Internet-of-Things (IoT) systems and protocols, overlay networks, peer-to-peer systems, and cloud/fog communications. Topics related to wireless networks will include channel access and routing in mobile ad hoc networks (MANETs), TCP over wireless networks, sensor networks, dynamic spectrum access (DSA) networks, etc. (see the attached list of topics). In the process of learning network architectures and protocols, students will be exposed to various analytical methods that are used in the design and engineering of next-generation networks. They will also use simulations to evaluate the performance of various design concepts.

Grading

Homework Assignments	30%
Quizzes	20%
Midterm Exam (tentatively on Wednesday Feb. 24)	25%
Semester Paper Presentation	25%
Class Participation (extra points)	10%

Remarks

1. **Csim Simulations:** Some homework assignments will require running discrete-event simulations. We will use a software package called Csim for such simulations. Csim is a C-based (or C++ based) programming environment for discrete-event simulation, developed by Mesquite Software Inc. I will spend at least two lectures reviewing the basics of Csim, but that will not be enough to cover all of its features. Therefore, you should start reading the Csim documentation on your own as soon as possible, and before I cover it in class. Csim's *User's Guide* and various examples are available on the D2L page (also found at <http://www.mesquite.com/> under 'Documentation').
2. **Semester Presentation:** In place of a final exam, each student will be required to study one topic in depth and present it to the rest of the class. The list of topics along with suggested papers will be provided by the instructor. The schedule for class presentations will be posted on D2L and announced in class. About 3-5 lectures will be dedicated to student presentations (30 min per presentation). For any given presentation, all students (including non-presenters) are required to read the assigned paper *before coming to class*. Some presentations will be followed by short unannounced quizzes, so please be prepared.
3. **Recorded Lectures and Online Material:** This course is being offered as 'Live Online' through Zoom. A Zoom link with passcode will be sent to registered students via email. Lectures will be recorded and will be made available for later viewing on the Cloud. **Make sure to access Zoom through your D2L page for both live as well as recorded lectures.** To access D2L, go to <https://d2l.arizona.edu> and log in using your UA NetID and password. You will see the D2L page for this class listed as 'ECE 564 SP21 001'. Click on the link for the class page. To access Zoom, click the 'UA Tools' menu and select 'Zoom for Students.' My PowerPoint slides as well as other class material will also be available on the same D2L page under the 'Content' tab.
4. **Reading Days:** As a replacement to the Spring Break, the UA has designated five 'Reading Days', spread throughout the semester, during which no classes will take place:
 - Thursday, February 25, 2021
 - Tuesday, March 9, 2021

- Wednesday, March 10, 2021
- Friday, April 2, 2021
- Wednesday, April 21, 2021

Only the two underlined days overlap with ECE 564 lectures.

General Course Policies

- Academic Integrity: The University's Code of Academic Integrity (Section 2.1a) states that students shall not "represent the work of others as their own." This policy will be applied to all work submitted for a grade: exams, quizzes, homework, and computer work. Any student submitting homework solutions or computer programs with part(s) copied from solutions provided by any instructor(s) in previous semesters, or from the text solutions manual, or from students who took the course in previous semesters, will automatically receive zero credit for ALL homework/computer work for the entire semester. In other words, all work must be original. The minimum penalty for cheating on exams and quizzes is an E grade. Group efforts are not permitted. You are free to use reference books to help you with assignments, but make sure that you cite any used reference.
- No late homework will be accepted without a valid (and documented) excuse.
- Make-up exams will be given only in emergency, which must be supported by written documentation (e.g., doctor's letter).
- All work must be completed during the semester (i.e., no incompletes will be given).