

ECE 598HH: Wireless Networks and Mobile Systems
University of Illinois at Urbana Champaign
Syllabus – Fall 2016

Webpage: <https://courses.engr.illinois.edu/ece598hh/>

Schedule: Lectures: Tuesday and Thursday 3pm-4:20pm, Room ECEB 3013

Instructor: Prof. Haitham Hassanieh
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Office: Coordinated Science Lab. CSL 463

Office Hours: Thursday 4:20 to 5pm, Room: CSL 463 or By Appointment

Catalog Info: Graduate Level Course, CRN: 66519, Credits: 4

Description: Wireless and mobile systems have become ubiquitous; playing a significant role in our everyday life. However, the increasing demand for wireless connectivity and the emergence of new areas such as the Internet of Things present new research challenges. This course introduces advanced research topics in wireless networks and mobile communication systems. In each lecture, we will discuss recent research papers that introduce new wireless designs, algorithms, protocols and applications. The papers are systems oriented and focus on practical challenges and solutions for building wireless and mobile systems. Student will also learn how to design and build wireless systems through a research project.

Prerequisites: Basic knowledge in computer networking and digital communications. One of the following courses: ECE 361 (Digital Communications) or ECE 438 (Communication Networks) or ECE 439 (Wireless Networks).

References: No textbook is required. Students are expected to read research papers. However, the following books are relevant resources:

- Computer Networking (A Top-Down Approach Featuring the Internet) J. F. Kurose and D. W. Ross, Addison-Wesley.
- OFDM Wireless LANs : A Theoretical and Practical Guide, John Terry and Juha Heiskala, Sams, 2002. Available @ MIT Libraries
- Fundamentals of Wireless Communication, David Tse and Pramod Viswanath, Cambridge University Press, 2005. Available Online

Grading
65% Project
30% Paper Reviews
5% Scribe

Lectures:

Date	Lec.	Topic
Aug. 23	1	Course Introduction
Aug. 25	2	Review Wireless Networks
Aug. 30	3	Rate Adaptation and Soft Information
Sep. 1	4	OFDM
Sep. 6	5	Wireless MAC
Sep. 8	6	Interference Cancellation
Sep. 13	7	MIMO I: Multiplexing, Diversity, MU-MIMO
Sep. 15	8	MIMO II: Interference Alignment, Nulling, Distributed MIMO
Sep. 16	9	IoT I: Backscatter Communication
Sep. 22	10	IoT II: Ambient Communication
Sep. 27	11	Wireless Localization I
Sep. 28	12	Wireless Localization II
Oct. 4	13	Physical Vibration Communication
Oct. 6	14	Wireless Sensing I
Oct. 11	15	Wireless Sensing II
Oct. 16	16	Wireless Security
Oct. 18	17	Software Defined Radios
Oct. 20	18	Project Proposal Discussions
Oct. 25	18	Network Coding
Oct. 27	19	Full Duplex Radios
Nov. 1	20	Spectrum Sensing
Nov. 3	21	Project Progress Discussions
Nov. 8	22	5G Technologies: Millimeter Wave, Cloud RAN
Nov. 10	23	Project Progress Discussions
Nov. 15	24	Wireless Charging
Nov. 17	25	Project Progress Discussions
Nov. 29	26	Visible Light Communication
Dec. 1	27	Project Final Discussions
Dec. 6	28	Project Final Presentations

Paper Reviews: Reading Material for each lecture is posted on the webpage. Students are expected to read one or two research papers before class and submit a short conference style paper review. The reviews should be submitted at the beginning of each class. The reviews should contain a one paragraph paper summary, few paper strengths, few paper weaknesses and comments.

Scribe: Students are expected to take notes in class. Each student has to scribe at least one lecture and submit him scribe notes to be posted on the class webpage.

- Project:** The course project is intended for students to carry out small research projects in teams of two or three. It has four components:
- A proposal:** which describes your problem, why it is important, your plan for tackling the problem, and how you are going to evaluate the solution. It should be no more than 3 pages. **(Due: Monday Oct. 17, 2016)**
 - A progress report:** which explains your approach, related/prior work, any preliminary results you might have obtained. **(Due: Monday Nov. 14, 2016)**
 - A final report:** conference-style paper describing the project and its key contributions/findings. **(Due: Thursday Dec. 8, 2016)**
 - A presentation:** conference-style presentation during the penultimate week of classes. **(Due: Tuesday Dec. 6, 2016)**
- Academic Integrity:** The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <http://studentcode.illinois.edu/>.
- Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <http://studentcode.illinois.edu/>. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.
- Students with Disabilities** To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible. To insure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should contact Disability Resources and Educational Services (DRES) and see the instructor as soon as possible. If you need accommodations for any sort of disability, please speak to me after class, or make an appointment to see me, or see me during my office hours. DRES provides students with academic accommodations, access, and support services. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu. <http://www.disability.illinois.edu/>.
- Emergency Response** Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency/>. I encourage you to review this website and the campus building floor plans website within the first 10 days of class. <http://police.illinois.edu/emergency/floorplans/>.
- FERPA** Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <http://registrar.illinois.edu/ferpa> for more information on FERPA.

Run > Hide > Fight

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with any kind of emergency – like fire, severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight.



Run

Leaving the area quickly is the best option if it is safe to do so.

- ▶ Take time now to learn the different ways to leave your building.
- ▶ Leave personal items behind.
- ▶ Assist those who need help, but consider whether doing so puts yourself at risk.
- ▶ Alert authorities of the emergency when it is safe to do so.



Hide

When you can't or don't want to run, take shelter indoors.

- ▶ Take time now to learn different ways to seek shelter in your building.
- ▶ If severe weather is imminent, go to the nearest indoor storm refuge area.
- ▶ If someone is trying to hurt you and you can't evacuate, get to a place where you can't be seen, lock or barricade your area, silence your phone, don't make any noise and don't come out until you receive an Illini-Alert indicating it is safe to do so.



Fight

As a last resort, you may need to fight to increase your chances of survival.

- ▶ Think about what kind of common items are in your area which you can use to defend yourself.
- ▶ Team up with others to fight if the situation allows.
- ▶ Mentally prepare yourself – you may be in a fight for your life.

Please be aware of persons with disabilities who may need additional assistance in emergency situations.

Other resources

- ▶ police.illinois.edu/safe for more information on how to prepare for emergencies, including how to run, hide or fight and building floor plans that can show you safe areas.
- ▶ emergency.illinois.edu to sign up for Illini-Alert text messages.
- ▶ **Follow the University of Illinois Police Department** on Twitter and Facebook to get regular updates about campus safety.