CS 442/642: Cybersecurity in the Internet of Things
Fall 2021

Course Information

- Class room: Wheatley W01-0012
- Class time: Tu/Th 09:30 AM - 10:45 PM
- Class websites: Check Piazza at piazza.com

Instructor: Dr. Xiaohui Liang

- Email: Xiaohui.Liang@umb.edu
- Office hour: Tu/Th 11:00 AM - 12:00 PM or by appointment

(Optional) Suggested Textbook and Reading Materials

- Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, by Francis daCosta, ISBN: 978-1-4302-5740-0, 2013
- Architecting the Internet of Things, by Dieter Uckelmann, Mark Harrison and Florian Michahelles, ISBN: 978-3-642-19157-2, 2011
- Internet of Things: Privacy & Security in a Connected World, Federal Trade Comission, 2015
- Security and the IoT ecosystem, KPMG International, 2015
- Securing the Internet of Things: Explore Security and Privacy in an Interconnected World, Hewlett Packard Enterprise, 2015

Course Description

"Internet of Things" (IoT) is an emerging technology that is changing our world with its innovative products such as "smart home", "consumer wearable", and "autonomous vehicle". This course aims to introduce the concept of IoT and its impact on our daily lives, to understand the architecture and components of IoT, and to address the challenges and solutions of deploying IoT in reality. Students will learn how to make design trade-offs between communication and computation costs and between hardware and software. In addition, cybersecurity is a critical design issue of the IoT system. From this course, students will become aware of the cybersecurity issues raised by IoT and gain the knowledge of the related security techniques. Students will also gain hands-on experiences on building IoT devices and implementing security techniques through team projects.

Topics Covered

- Sensors and actuators in IoT
- Communication and networking in IoT
- Real-time data collection in IoT
- Data analytics in IoT
- IoT applications and requirements
- Security threats and techniques in IoT
- Data trustworthiness and privacy in IoT
- Balancing utility and other design goals in IoT
- Programming IoT applications using Arduino or Raspberry Pi
- Blockchain and IoT

Course Goals and Learning Objectives

Students successfully completing this course will:

- Understand the impact of IoT technologies
- Be able to draw the big picture of IoT ecosystem
- Be able to identify the architecture of IoT systems
- Be able to describe the essential components of IoT
- Have the knowledge of the emerging technologies of IoT
- Be able to examine the security and privacy challenges of IoT
- Be able to find appropriate security/privacy solutions for IoT
- Have hands-on experience on IoT and security projects.

Pre-requisite

CS310

Course Work

- Attendance: 5%
- Four assignments + one final project: 50% = 10% *4 + 10%
- Midterm exam: 15%
- Final exam for undergraduate students: 30%
- *Final exam (20%) and final paper (10%) for graduate students.

Grading Scale (Undergraduate)

- 90+ = A; 87-89 = A-; 84-86 = B+; 80-83= B; 77-79 = B-; 74-76 = C+;
- 70-73 = C; 67-69= C-; 64-66 = D+; 60-63 = D; <60 = F

Grading Scale (Graduate)

- 93+ = A; 90-92 = A-; 87-89 = B+; 83-86= B; 80-82 = B-; 77-79 = C+;
- 73-76 = C; <72 = F

Grading Policies

- For assignment and project, no late submissions are accepted unless you have made prior arrangements with me.
- There will be no makeup exam for midterm and final exams.

Accommodations
This class seeks ways to become a working and evolving model of inclusion and universal design for all participants. Individuals with disabilities of any kind (including learning disabilities, ADHD, depression, health conditions), who require instructional, curricular, or test accommodations are responsible for make such needs known to the instructor as early as possible. Every effort will be made to accommodate students in a timely and confidential manner. Individuals who request accommodations must be registered with the Ross Center for Disability Services, which authorizes accommodations for students with disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, M-1-401, (617-287-7430), `www.rosscenter.umb.edu`. The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of Drop/Add period.

Student Conduct
Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the catalog of Undergraduate Programs, pp. 44-45, and 48-52. The Code is available online at: `https://www.umb.edu/life_on_campus/policies/community/code`.

Additional information
My emails to the class will be sent from the Blackboard system so make sure that your email address is set up correctly with Blackboard. You should visit the Blackboard website regularly for other information including latest announcements about the class. Make sure you check your UMB e-mail address (usually firstname.lastname001@umb.edu) regularly and/or redirect it to another e-mail address you use more frequently. No excuses regarding infrequent use of this e-mail address will be accepted.

This is a course conducted as lectures, presentations and labs. The material will be posted on Piazza before class time. Students are expected to read class materials before attending to class. Other notes and materials are accessible from Piazza during class. Grades will be posted on Blackboard.