

## SE 5402: Architecture of Internet of Things

**Course Instructors: Song Han, Ph.D. and Shengli Zhou, Ph.D.**

**Catalog Description.** 3 credits. This course is designed to provide students and professional engineers with a thorough understanding of the design, development, validation and evaluation of IoT systems, especially in industrial domains with stringent timing and performance requirements. The student will develop skills in specifying the requirements for the target IoT systems, selecting the appropriate hardware and software platforms, and validating and evaluating the system performance. Special emphasis will be placed on the semester-based industrial projects that will be designed from selected industrial domains to address real-life problems.

**Course Objective.** Applying emerging wired and wireless networking protocols, real-time and embedded systems design principles, and edge and cloud computing technologies to design and develop Internet of Things (IoT) applications, and evaluate its performance. Understanding the constraints, requirements, and architectures of hardware and software components for IoT systems.

**Prerequisites.** An undergraduate degree in electrical engineering, computer engineering, or computer science or completed a graduate level course in embedded or network systems.

**Anticipated Student Outcomes.** By the end of the course, a student will be able to:

- (1) Develop IoT solutions based on popular hardware/software platforms to address real-life problems
- (2) Evaluate the cost, power, and performance trade-offs associated with IoT solutions

### Texts

- Lecture notes developed by the instructors (Mandatory)
- Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security, Jan 22, 2018, by Perry Lea (Optional)
- 802.15.4-2015 - IEEE Standard for Low-Rate Wireless Networks (Optional): <https://ieeexplore.ieee.org/document/7460875>

- 802.11-2016 - IEEE Standard for Information technology – Telecommunications and information exchange between systems Local and metropolitan area networks – Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications (Optional):  
<https://ieeexplore.ieee.org/document/7786995>

**Copyright.** Copyrighted materials within the course are only for the use of students enrolled in the course for purposes associated with this course and may not be retained or further disseminated.

**Due Dates and Late Policy.** All course due dates are identified in the Course Schedule. Deadlines are based on Eastern Standard Time; if you are in a different time zone, please adjust your submittal times accordingly. The instructor reserves the right to change dates accordingly as the semester progresses. All changes will be communicated in an appropriate manner.

**Student Conduct:** [http://www.dosa.uconn.edu/student\\_code.html](http://www.dosa.uconn.edu/student_code.html). Students are responsible for adherence to the University of Connecticut student code of conduct. Pay attention to the section on Student Academic Misconduct, “Academic misconduct is dishonest or unethical academic behavior that includes, but is not limited, to misrepresenting mastery in an academic area (e.g., cheating), intentionally or knowingly failing to properly credit information, research or ideas to their rightful originators or representing such information, research or ideas as your own (e.g., plagiarism).” Examples of academic misconduct in this class include, but are not limited to: copying solutions from the solutions manual, using solutions from students who have taken this course in previous years, copying your friend’s homework, looking at another student’s paper during an exam, lying to the professor or TA and incorrectly filling out the student workbook.

## Course Schedule\*

Date	Topic	Details
Jan. 21 - Jan. 24	Week 1: Introduction and Architecture Overview	Lecture videos on Wednesday
Jan. 27 - Jan. 31	Week 2: Hardware Platform for IoT devices	Lecture videos on Wednesday
Feb. 3 - Feb. 7	Week 3: Real-Time Operating Systems	Lecture videos on Wednesday
Feb. 10 - Feb. 14	Week 4: Communication Principles	<b>Project Proposal Discussion</b>
Feb. 17 - Feb. 21	Week 5: Software Defined Radio Platforms	Lecture videos on Wednesday
Feb. 24 - Feb. 28	Week 6: Wireless Network MAC Layer Design I	Lecture videos on Wednesday
March 2 - March 6	Week 7: Wireless Network MAC Layer Design II	<b>Individual/Group project commences</b>
March 9 - March 13	Week 8: Cellular Networks and NB-IoT	Lecture videos on Wednesday
March 16 - March 20	Spring Recess	
March 23 - March 27	Week 9: Network and Transport Layer Design I	Lecture videos on Wednesday
March 30 - April 3	Week 10: Network and Transport Layer Design II	Lecture videos on Wednesday
April 6 - April 10	Week 11: Edge Computing	Lecture videos on Wednesday
April 13 - April 17	Week 12: IoT Data Analytics I	Lecture videos on Wednesday
April 20 - April 23	Week 13: IoT Data Analytics II	<b>Project Presentations</b>
April 27 - May 1	Week 14: Course Review	<b>Project Presentations</b>

\* Schedule is tentative and may change

**Adding or Dropping a Course.** If you should decide to add or drop a course, there are official procedures to follow:

- Matriculated students should add or drop a course through the Student Administration System.
- Non-degree students should refer to Non-Degree Add/Drop Information located on the registrar's website.

You must officially drop a course to avoid receiving an "F" on your permanent transcript. Simply discontinuing class or informing the instructor you want to drop does not constitute an official drop of the course. For more information, refer to the online [Graduate Catalog](#),

**Grading.** As this is a graduate course, we will adopt relative grading for this course. The distribution of points will be fitted to a normal distribution curve and the grades will be awarded according to the performance of the student.

**Academic Calendar.** The University's Academic Calendar contains important semester dates.

**Students with Disabilities.** Students needing special accommodations should work with the University's Center for Students with Disabilities (CSD). You may contact CSD by calling (860) 486-2020 or by emailing [csd@uconn.edu](mailto:csd@uconn.edu). If your request for accommodation is approved, CSD will send an accommodation letter directly to your instructor(s) so that special arrangements can be made. (Note: Student requests for accommodation must be filed each semester.)

#### Instructors' Contact Information.

- Song Han: [song.han@uconn.edu](mailto:song.han@uconn.edu)
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#### Helpful Links:

- Virtual Computer Lab at UConn: <http://skybox.uconn.edu/>
- Course Material: <https://lms.uconn.edu>
- Institute for Advanced Systems Engineering: <http://www.utc-iase.uconn.edu/>