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# ECE 448 - Wireless Sensor Networks

## Spring 2017

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**Time:** Monday and Wednesday, 2-3:15PM

**Location:** Computer Studies Building (CSB) 523

**Instructor:**

Cristiano Tapparello

Hopeman 334

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Office hours: Monday, 4-5PM (additional time by appointment)

**References:** *Protocols and Architectures for Wireless Sensor Networks*, H. Karl and A. Willig, Wiley Publishers, 2005.

**Additional course material:** Lecture slides and research papers (Blackboard)

**Class description:**

This course will cover the latest research in the area of Wireless Sensor Networks. We will cover all aspects of these unique and important systems, from the hardware and radio architecture through protocols and software to applications. Topics will include sensor network architectures, hardware platforms, physical layer techniques, medium access control, routing, topology control, quality of service (QoS) management, localization, time synchronization, security, storage, and other advanced topics. Each student must complete a semester-long course project related to wireless sensor networks.

**Syllabus (*subject to change*)**

- Introduction to Wireless Sensor Networks Systems
- Network Architecture
- Hardware Platforms
- Introduction to ns-3
- Medium Access Control Protocol Design
- Routing Protocols
- Routing Protocols for WSN
- Clustering
- QoS Management
- Localization
- Time Synchronization
- Programming in WSNs
- Energy Harvesting WSNs

**Class objectives:**

The goal of the class is to learn the basic principles behind a Wireless Sensor Network. Following the ISO Open Systems Interconnection (OSI) model, the class presents the particular challenges of designing network protocols, services and applications for WSNs composed of large numbers of constrained devices. Moreover, the class provides an introduction to Network Simulator 3 (ns-3), a well-know and widely adopted network simulator, focusing in particular on the simulation of wireless networks.

**Prerequisites:** No specific requirement. ECE 245/445: Wireless Communications (or another network communication class) can be beneficial.

**Grading:** Grades will be based on homework assignments, exams (a mid-term and a final), and a course project. The weights are as follows:

Mid-term Exam	25%
Final Exam	25%
Course Project (Paper + Presentation)	25%
Homeworks	25%

There will be approximately 5 homework assignments throughout the semester. In general, late homeworks will not be accepted.

Each student must complete a course research project related to a topic in the wireless communications and networking area. Projects can be based on simulations, analysis, or field experiments. Any topic related to the wireless sensor network field is acceptable, subject to approval. You may work in groups of 2, but this is not required. At the end of the semester, each group will present their work in class and turn in a conference-style paper describing the project.

**Academic dishonesty:** Academic dishonesty will be dealt with according to the University of Rochester's Academic Honesty Policy.

<http://www.rochester.edu/college/honesty>

<https://www.rochester.edu/college/CCAS/AdviserHandbook/AcadHonesty.html>

It is expected that all work turned in has been completed independently. Students may discuss homework problems, but the solutions should be written up independently. Plagiarism is strictly prohibited. This includes copying any text or ideas not one's own on any homework, labs or other written work such as paper surveys and the final project. Plagiarism, copying of homework or exam questions, or any other acts of academic dishonesty will be brought to the UR academic honesty board. Consequences may include a drop in the final letter grade, or, for more serious or repeat offenses, suspension or expulsion.