

**16:332:579:02 – Index # 36131**  
**(by special permission number)**  
**Advanced Topics in Computer Engineering: Sensor Networks**  
**Fall 2007**

**Instructor: Prof. D. Pompili**

**T,Th 7th (6:40 pm – 8:00 pm)**  
**Room: CoRE Bldg, Rm 601**

**Prerequisites:** Communications Networks I

**Course Overview:** This course will describe the architectural and protocol characteristics of sensor networks and will present the differences from ad-hoc networks. In addition, the course will introduce networking protocols for wireless sensor networks in harsh environments at different layers of the protocol stack. Specifically, application, transport, routing, and medium access control protocols will be reviewed. Lectures will be reinforced with programming and lab exercises that will aim at developing skills in programming sensors and analyzing network performance.

**Goals:** To teach how sensor networks work and to develop skills in programming sensors and analyzing network performance.

**Homework:** Homework and exams will be based on class notes, which will be available in power point version on the class web site. A list of reference books and research papers will be given throughout the lectures. Some of the research papers and reports will be given as "supplemental reading".

**Week-by-Week Syllabus**

- Week 1:** Introduction and Applications
- Week 2:** Factors Influencing Sensor Network Design
- Week 3:** Application Layer, Queries, and Network Management
- Week 4:** Transport Layer Protocols
- Week 5:** Network Layer Protocols
- Weeks 6 and 7:** Medium Access Control Protocols
- Week 8:** Error Control Techniques and Optimal Packet Size
- Week 9:** Cross Layer Protocol Solutions
- Week 10:** Time Synchronization
- Week 11:** Localization Algorithms
- Week 12:** Actor and Sensor Networks
- Week 13:** Wireless Multimedia Sensor Networks
- Week 14:** Underwater Sensor Networks
- Week 15:** Underground Sensor Networks
- Week 16:** Review, Final Project & Final Examination

**Textbooks:** No text required; optional textbooks will be discussed

**Computer Usage:** Use of software tools for network performance analysis

**Laboratory Projects:** Develop basic knowledge of TinyOS and program MicaZ motes

**Amount of Homework Required or Suggested per Week:** 3 hours