

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

COMPUTER ENGINEERING DEPARTMENT

COE 545: Wireless Sensor Networks Term 172 (Winter 2018) Course Syllabus

Instructor: Dr. Abdulaziz Barnawi

Lecture: M.W.: 5:00-6:15 PM

Class location: Bldg 22 Room 130

Office hours: M. 3:00-4:00 PM , W. 9:00-10:00AM (in 59/2065), or by appointment

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Course Description:

Advanced development in wireless communication technologies as well as an increasing interest in applications that involve environment monitoring and control (e.g. wildfire and habitat monitoring, structural control, health care and target tracking in military systems) has led to the emergence of a new kind of wireless networks, namely wireless sensor networks. The objective of this course is to introduce students to the state of the art in wireless sensor actuator networks. Lectures will emphasize aspects of energy management, MAC protocols, routing and data aggregation, localization. Case studies from existing applications will be used.

Prerequisite: Undergraduate level in computer networking and data communication

Textbook[‡]:

There is no specific textbook assigned for this course. The main three books used in lecture slides are:

- B1.** *Protocols and Architectures for Wireless Sensor Networks* by Holger Karl and Andreas Willig, Wiley, ISBN: 0-470-09510-5, June 2005
- B2.** *Wireless Sensor Networks*, by Ian F. Akyildiz and Mehmet Can Vuran, John Wiley & Sons 2010, ISBN: 978-0-470-03601-3.
- B3.** *Fundamentals of Wireless Sensor Networks: Theory and Practice* by Dargie, Waltenegus and Poellabauer, Christian, John Wiley & Sons 2010, ISBN: 9780470997659

The following books are also *recommended* as a supporting reading material:

- B4.** *Wireless Sensor Networks*, by Suraiya Tarannum, ISBN 978-953-307-325-5, 342 pages, Publisher: InTech.
- B5.** *Ad hoc Wireless Networks – Architecture and Protocols*, by C. Siva Ram Murthy and B. S. Manoj, Prentice Hall, 2004, ISBN – 013-147-023x.

Tentative Grading Policy:

Class participation	5%
Assignments/paper presentations	15%
Project	35%
Mid-Term	15% (March 05, 2018 – tentative)
Final	30% (May 12, 2018)

Important Policies:

- All KFUPM regulations and standards will be enforced. Attendance will be checked each class.
- You have 48 hours to object to the grade of a presentation or assignments from the end of the class time in which the graded submissions have been distributed back.
- Check the course webpage and Blackboard for updates, emails and announcements.
- Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated.

[‡] There are electronics versions of the main reference books. You can find them through KFUPM digital library

Expected Learning Outcomes

Upon successful completion of this course:

1. Students will be introduced to some existing applications of wireless sensor actuator networks.
2. Students will be introduced to elements of network protocol design and will learn to apply these principles in the context of wireless sensor networks
3. Students will learn the various hardware, software platforms that exist for sensor networks
4. Students will get an overview of the various protocols for MAC layer, routing, time synchronization, aggregation.
5. Students will read and present seminal papers on various issues in sensor networks, opening a path to course project as well as possible research in this area.
6. Students will understand what research problems sensor networks pose in disciplines.

Tentative Class Schedule

Week	Lecture	Date	Topic
1	1	22-Jan	Logistics and introduction
	2	24-Jan	Sensor node architecture
2	3	29-Jan	Power and Energy Management
	4	31-Jan	Basics of Wireless Communications
3	5	5-Feb	Sensor Network Architecture
	6	7-Feb	Network Bootstrapping and Clustering / <i>Regular Assignment (A1)</i>
4	7	12-Feb	Network Bootstrapping and Clustering (cont.)
	8	14-Feb	<i>Reading Assignment (A2)</i>
5	9	19-Feb	<i>Reading Assignment (A3)</i>
	10	21-Feb	Medium Access Control (MAC) (Introduction) / <i>Project proposal draft submission</i>
6	11	26-Feb	MAC Protocols for Sensor Networks
	12	28-Feb	MAC Protocols for Sensor Networks (cont.)
7	13	5-Mar	Mid-term Exam
	14	7-Mar	MAC Protocols for Sensor Networks (cont.)
8	15	12-Mar	Routing and Data Aggregation / <i>Project proposal submission deadline</i>
	16	14-Mar	Routing and Data Aggregation (cont.) / <i>Regular Assignment (A4)</i>
9	17	19-Mar	<i>Project proposal presentations</i>
	18	21-Mar	<i>Invited Speaker</i>
10	19	26-Mar	Localization
	20	28-Mar	Localization (Cont.)
11	21	2-Apr	Reading Assignment (A5)
	22	4-Apr	Reading Assignment (A6)
12	23	9-Apr	Time Synchronization
	24	11-Apr	Time Synchronization (Cont.) / <i>Regular Assignment (A7)</i>
13	25	16-Apr	<i>Invited Speaker</i>
	26	18-Apr	Reading Assignment (A8)
14	27	23-Apr	Reading Assignment (A9)
	28	25-Apr	Recap
15	29	30-Apr	Project Presentations
	30	2-May	Project Presentations