



Course Syllabus

1) Identification

Course: Wireless Networks (Redes sem Fio)

Workload: 45 horas-aula - 3 créditos

Instructor: Alex Sandro Roschildt Pinto

Semester: 2019.2

2) Prerequisites:

Knowledge of programming, data structures and computer networks.

3) Overview:

History of different types of wireless technologies, Physical characteristics of wireless transmission, Medium Access Control, Mobile network layer issues, Wireless Networking Standards, Wireless Sensor Networks, Internet of Things, New Trends in Wireless Networks.

4) Course Objective

General:

Provide a broad view of Wireless Networks protocols, applications and new paradigms like wireless sensor networks and internet of things.

Specific Objectives:

- Present the history of different types of wireless networks, physical characteristics and medium access control;
- Provide an understanding of the characteristics and requirements of a wireless network application;
- Present and discuss new trends and paradigms in wireless networks paradigm like: wireless sensor networks and internet of things;
- Allow students to model and investigate new algorithms, architectures and applications based on wireless networks.

5) Contents:

- History of different types of wireless technologies
 - o Cellular systems, satellite systems, broadcast systems, wireless LANs
- Physical characteristics of wireless transmission (including signals, antennas, multiplexing, modulation, interference)
- Medium Access Control
 - o Coordinated access (TDMA-based, CDMA-based, ...), Random access
- Mobile network layer issues
 - o Mobile IP
 - o Ad-hoc Routing
- Wireless Networking Standards:

- o 3G systems, wireless LAN standards (IEEE 80.11), WMAN standards (IEEE 802.16), WPAN standards (IEEE 802.15), LORA e SigFox.
- Wireless Sensor Networks
 - o Applications
 - o Parameters Optimization
 - o Ad-Hoc Routing
 - o Data Fusion
 - o Security
 - o Vehicular Networks
 - o Robot and Sensor Networks
- Internet of Things
 - o Applications
 - o Main Challenges
 - o Iot Data Storage
 - o Machine Learning applied to IoT
- New Trends in Wireless Networks
 - o Flying Aerial Networks
 - o Economy of Things

6) Methodology

The topics will be presented by the instructor by means of slides prepared based upon the course textbooks. The students are requested to make further readings in the textbooks as well as in the complementary bibliography, especially when preparing their seminars.

The course will also count with a practical part in which the students will select one topic to implement a prototype of an existing technique or of a modified technique. Such practical part will result in the course "project", which will be assessed by means of a specific seminar, the prototype itself and a paper following scientific writing guidelines that will be submitted to a conference or journal. The project will be implemented mostly out of class time.

7) Assessment and Grading

The assessment instruments are:

- Two seminars on topics selected from the course contents (grades S1 and S2)
- Project:
 - o Demonstration of prototype (grade Demo)
 - o Paper submitted to a conference or journal (grade Report)
- Ratio of attended other's seminars (R)

The final grade (G) will be computed as:

$$G = 0.4 R (S1 + S2) + 0.4 \text{ Demo} + 0.2 \text{ Report}$$

8) Schedule

Class	Contents
1	<ul style="list-style-type: none"> - History of different types of wireless technologies <ul style="list-style-type: none"> o Cellular systems, satellite systems, broadcast systems, wireless LANs
2	<ul style="list-style-type: none"> - Medium Access Control Coordinated access (TDMA-based, CDMA-based, ...), Random

	access
3	- Mobile network layer issues Mobile IP Ad-hoc Routing
4	- Wireless Networking Standards: 3G systems, wireless LAN standards (IEEE 80.11), WMAN standards (IEEE 802.16)
5	Seminars S1
6	WPAN standards (IEEE 802.15), LORA e SigFox.
7	Wireless Sensor Networks
8	Wireless Sensor Networks
9	Internet of Things
10	Internet of Things
11	Seminars S1
12	Seminars S1
13	New Trends in Wireless Networks o Flying Aerial Networks
14	Economy of Things
15	Seminars S1
16	Seminars S1
24	Seminars S2
25	Seminars S2
26	Seminars S2
27	Seminars S2
28	Project discussion/presentation
29	Project discussion/presentation
30	Project discussion/presentation

Notice: class #1 will be in the first week of August 2019 and class 30 will be in the last week of November 2018.

9) Textbooks

[1] Kurose & Ross, [Computer Networking: A Top-Down Approach, 6th Edition](#), Pearson, 2013, ISBN-13: 9780132856201

8) Complementary Bibliography

[2] Selected papers of state-of-the-art wireless networks.