Introduction to Wireless Communications

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ECTS: 5

Level: Master students & Final Year Undergrads

Brief Description

This module provides an introduction to the theory of communications systems from a signals and systems viewpoint. The course will introduce basic principles and techniques used in modern digital communications systems. The course is targeted towards the Master students in Computer Engineering, Computer Science, Information and Technology. The students are assumed to pass basic courses in calculus, discrete mathematics and probability theory. The student will carry out a short project using MATLAB (test different communications algorithms and techniques).

Learning Outcome

On successful completion of this module, students will be able to:
1. What are the basic principles of modern communications?

2. Characterise noise from a probabilistic standpoint
3. Explain the principles underlying the main modulation schemes.

4. How to model a simple communications system?

5. Demonstrate the basic understanding of CDMA, OFDM and MIMO systems

Learning Schedule

	Hrs/Semester
Lectures	30
Tutorial	6
Specified Learning Activities	20
Autonomous Student Learning	60
Total Workload	116

Assessment

	% of Final Grade	Timing
Class Test: Mid-semester test	20	Week 7
Examination: Written Examination	50	2 hour End of Semester Exam
Assignments	20	Varies over the Semester
Project	10	

Preliminary syllabus

1. Why Wireless is Different?
2. Digital versus analog communications
3. Modulations; analog and digital modulation schemes
4. Standard modulation schemes
5. Radio Channels
6. Digital communication system model
7. Gaussian noise model
8. Code Division Multiple Access (CDMA)
9. Error probability performance analysis (project)
10. OFDM (frequency-division multiplexing Modulation)
11. Introduction to Cellular Communication Systems
12. LTE (Long-Term Evolution , commonly marketed as 4G LTE
13. 5G: Next generation wireless communications 2020

Indicative Reading List

Simon Haykin,: 0, Communication Systems 5/E, 5th edition, 0470169966

John G. Proakis, Masoud Salehi: 2008, Digital communications, McGraw-Hill, Boston, 0071263780

Leon W. Couch II: 2001, Digital and analog communication systems, Prentice Hall, Upper Saddle River, N.J., 0130896306

S. Unnikrishna Pillai Athanasios Papoulis,: 0, Probability, Random Variables and Stochastic Processes International Edition, 0071226613