Universidad Zaragoza
1542

Year : 2018/19

30334 - Radio-Frequency Technology

Syllabus Information

Academic Year:	2018/19
Subject:	30334 - Radio-Frequency Technology
Faculty / School:	110 -
Degree:	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS:	6.0
Year:	
Semester:	First semester
Subject Type:	
Module:	---

General information

Aims of the course

Context and importance of this course in the degree

Recommendations to take this course

Learning goals

Competences

Learning goals

Importance of learning goals

Assessment (1st and 2nd call)

Assessment tasks (description of tasks, marking system and assessment criteria)

Methodology, learning tasks, syllabus and resources

Methodological overview

The Learning planning which concerns the teaching methodology in this course is based on the following:

1. Lectures. - Teacher presentation or explanation in class (with possible proofs and demos).

2. Based problem Learning and assignments.-Oriented approach so that the students learn by means of real problems in small groups under tutor supervision.

3. Laboratory.- Activities in special spaces with specialized equipment (laboratory, computer rooms).

4 Theoretical works. Preparation of seminars, lectures, research papers, reports, etc. to be presented or delivered in class.

5. Grading.-Set of written, oral tests, practices, projects, jobs, etc. used to assess the student skills.

6. Personal Assessment- meetings to review and discuss the materials and topics presented in lectures.

Learning tasks

1. Class Lectures (40 hours) in which the theoretical foundations of the contents of the subject are presented and where student participation is encouraged.

2. Problems and case studies (10 hours) in which problem solving and practical cases are held.

3. Laboratory Practice (10 hours) in which students will perform 5 Lab sessions of 2 hours.

4. Practical group work, supervised by the teacher, based on the course contents and public presentations.

5. Personalized assessment to students through individual meetings.

Syllabus

1.RF Front Ends

1.1 Transmitters.

1.2 Receivers

1.3 Radiofrequency signals: mathematical analysis.

1.4 Noise in RF systems.

1.5 Linear and non-linear distortion.

2. Synchronization and Modulation.

2.1 Phase Lock-loops.

2.2 Frequency Synthesizers

2.3 Modulators and demodulators.

3. RF devices and Impedance Matching in RF systems.

3.1 Lumped Elements. High frequency effects.

3.2 RF Diodes.

3.3 RF Transistors.

3.4 Narrowband and broadband impedance networks.

4. RF Passive and Active Circuits.

4.1 RF Network Analysis: Review of Scattering Parameters.

4.2 RF filters: analysis and design.

4.3 Power Dividers, couplers and multiplexers.

4.4 RF amplifiers.

4.5 RF Oscillators.

4.6 RF Mixers.

5. Software Defined Radio (SDR) Introduction and RF signal processing.

5.1 Introduction

5.2 SDR architectures.

5.3 SDR receiver architectures.

5.4 Reconfigurable Transmitters and Power Amplifiers.

5.5 RF signal processing: transmitter Linearization in SDR.

Lab Assignments

TL1. Introduction to RF simulation. Passive Circuit analysis and design.

TL2. Active Circuit Analysis and Design I.

TL3. Active Circuit Analysis and Design II.

TL4. RF Device Measurements I.

TL5. RF Device Measurements II.

Student Projects and Workshops:

TT1. Introduction to system level RF design.

TT2. Research and/or development of a RF subsystem applied on a specific area (Wireless Communication, Radiolinks, radionavigation, RFID,...) and public presentation.

Course planning and calendar

The following distribution of activities throughout the semester are scheduled:

- Weekly sessions of lectures, which include problem solving sessions that cover a total of 50 hours.

- 5 2-hour Lab sessions in small groups which are held in the High Frequency Laboratory (L3.06).

- 3 2-hour Workshoop which are held in the High Frequency Laboratory (L3.06) in order to explain system level design, simulator introduction and the student project.

- Personal Assessment meetings are flexible and agreed for convenience between students and professor.

Problem Lectures and laboratory sessions are held according to the schedule set by University. Timetables will be announced on the EINA website.

As far as grading is concerned, partial (midterm) written examination dates will be announced by the university and be carried out in two parts, at mid-course and at the end of the course. It will be announced in advance.

Related Final examination shall be proposed by University.

Bibliography and recommended resources

- 1. Pozar, David M.. Microwave and RF wireless systems / D. M. Pozar John Wiley & Sons, 2001
- 2. Sorrentino, R. Microwave and RF engineering / R. Sorrentino John Wiley & Sons, 2010
- 3. Steer, M. Microwave and RF design: a systems approach / M. SteerSciTech, 2010