High frequency technology

Academic Year: (2019 / 2020) **Review date: 21-05-2019**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: SEGOVIA VARGAS, DANIEL

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

STUDENTS ARE EXPECTED TO HAVE COMPLETED

It is expected that students have knowledge on microwave circuits and antennas

OBJECTIVES

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

CB6 achieve and understand knowledge that can be the starting point for an original research work
CB7 Students will be able to apply the achieved knowledge in the resolution of new problems in interdisciplinary and broad areas
CB9 Students will be able to transmit their conclusions and new knowledge to both specialist and non-specialist public in a clear and unambiguas way. CB10 Students will achieve the learning abilities so that they can go on studying by themselves.
CG1 Understanding of the techniques needed for the microwave and antennas fields.
CG4 Capacity to realize critical analysis and synthesis of new ideas.
CG5 Capacity to communicate the new ideas, both in English and in Spanish, to the international scientific community.
CE1 Students will be able to realize a critical analysis of technic and scientific papers in the field of RF subsystems for communication systems.
CE2 Students will achieve an exhaustive perspective in the state of the art for RF subsystems for communication systems.
CE3 Students will be able to develope original RF subsystems for communication systems. They will be able to present their work in international conferences.
CE4 Students will be able to apply maths, statistics and scientific knowledge to RF subsystems for communication systems
CE5 Students will have the ability to design RF experiments, analyze and interpret the results.
CE6 To be able to development of the concepts of the design of digital communications systems and their subsystems (modulations, antennas and transmitters and receivers), to know how to analyze the benefits of these systems and be able to make design and implementation decisions.
CE9 To acquire critical judgment about the choice of the appropriate electromagnetic simulation software tool for the analysis/design of each of the components/subsystems of a telecommunication system (active antennas, antenna arrays, broadband antennas, filters, amplifiers, oscillators and mixers).

Learning outcomes

RA1: Getting the knwoledge about how a radio link works
RA2: Analysis and design of a modern communication system
RA3: Optimization of the different blocks comprising transmitters and receivers

DESCRIPTION OF CONTENTS: PROGRAMME

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Lesson 1: Transmitters and receivers in communications systems. System quality parameters.
Lesson 2: Analysis of passive systems modules TR/RX: diplexors, filters,¿
Lesson 3: Semiconductor basic concepts in microwave and mm frequencies.
Lesson 4: Analysis of active systems modules TR/RX: amplifiers, oscillators and mixers.
Lesson 5: Antenna as a RF subsystem
Lesson 6 Introduction to millimeter technologies and THz

Lesson 7: Measurements techniques
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LEARNING ACTIVITIES AND METHODOLOGY

Formative activities included in the curriculum

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AF1 Theoretical lesson
AF2 Practical lesson
AF3 Computer lab lesson.
AF4 Laboratory practices
AF6 Teamwork
AF7 Individual work of the student
AF8 Midterm and final exams

Código actividad Estudiante	Nº horas totales	Nº horas presenciales	% presencialidad
AF1	32	32	100
AF2	4	4	100
AF3/AF4	10	10	100
AF6	0	0	0
AF7	100	0	0
AF8	4	4	100
TOTAL	150	50	33

Methodology

MD1 Master class supported by computing and audiovisual media, where the main topics are exposed, and bibliography is provided to complement the learning by the students.

MD2 Critical reading of recommended texts: press articles, reports, textbooks and/or academic papers, both to be later discussed in class, or to complement and consolidate the knowledge of the topic.

MD3 Resolution of practical cases, problems, etc., proposed by the teacher, individually or in groups.

MD4 Exposition and discussion in class of topics related to the course and practical cases, under teacher moderation.

MD5 Elaboration of assignments and reports individually or in groups

ASSESSMENT SYSTEM

EVALUATION SYSTEMS:

ASSESSMENT SYSTEMS OF THE STUDY PLAN REFERRED TO SUBJECTS

SE2 Individual or group work carried out during the course
SE3 Final exam

System of Evaluation	Minimum weight (%)	Maximum weight (%)
SE2	40%	100%
SE3	0%	60%

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- C. A. Balanis Advanced Engineering Electromagnetics, John Wiley & Sons, Inc., 1989

- Guillermo Carpintero, Enrique Garcia-Munoz, Hans Hartnagel, Sascha Preu Antti Raisanen Semiconductor TeraHertz Technology: Devices and Systems at Room Temperature Operation, John Wiley & Sons, 2015

- Pfeiffer et al Advanced Millimeter wave techonologies, Wiley , 2009

- Richard J. Cameron, Chandra M. Kudsia, Raafat R. Mansour Microwave Filters for Communications Systems, John Wiley & Sons, 2007

- Sorrentino Microwave and RF engineering, Wiley, 2010