Plannar Antennas for Wireless Systems

Code: 42834
ECTS Credits: 6

2024/2025

Degree	Type	Year
4313797 Telecommunication Engineering	OB	1

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

The student is supposed to have knowledge about radiation, guided waves, fundamental parameters of antenna and the transmission equation

Objectives and Contextualisation

Once completed the course the student should be able to:

1. Understand and describe the structures that are commonly used in the design of planar antennas.
2. Apply different techniques to adjust the antennas to the requirements of a particular application.
3. Use simulation tools to predict the behavior of these antennas.
4. Carry out measurements of different parameters of antennas.

Competences

- Capacity for developing radio communications systems: design of antennas, equipment and subsystems, channel modelling, calculation of links and planning.
- Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
- Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Learning Outcomes

1. Analyze antennas assessing whether they meet the requirements of an application.
2. Carry out measurements of different parameters of antennas.
3. Design antennas according to the requirements of a particular application.
4. Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study

5. Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously
6. Use electromagnetic simulation tools for the analysis and design of antennas

Content

1. Introduction
2. Fundamental parameters of antennas
3. Fundamentals of radiation
4. Dipole antennas
5. Loop antennas
6. Slot antennas
7. Microstrip antennas
8. Simulations Tools
9. Measurement Techniques

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab classes	15	0.6	4, 6
Lectures	30	1.2	4, 5, 6
Type: Supervised			
Supervision meetings	15	0.6	4, 5, 6
Type: Autonomous			
Personal work	56	2.24	4, 5, 6

Guided activities:

- Lectures: explanation of theoretical contents with application examples
- In the lab: develop a planned activity using simulation tools and measurement techniques

Autonomous activities:

- Individual study of the subject
- Solving exercises, preparation of lab activities and reports

Supervised activities:

- Individual or Small group meetings to clarify concepts, to advise on the development of the course or to attend other specific issues.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final exam	50%	3	0.12	4, 5, 6
Lab activities	30%	15	0.6	1, 3, 2, 4, 5, 6
Solving exercises	20%	16	0.64	4, 5, 6

This subject/module is not included in the single assessment system.

a) Evaluation activities

- Final exam (FEx): 50%. Short questions and problems. It is compulsory to obtain FEx >= 4 to pass the course.
- Solving exercises (EX): 20%. Short questions and problems will be proposed throughout the course.
- Lab activities (LR): 30% reports on the activities developed in the lab (25%) and lab exam (short questions 5%).

Any evaluation activity delivered after the deadline will be qualified with zero.

b) Evaluation activities schedule

- FEx: final exam dates will be public the first day of the course in the Campus Virtual and the web page of the Engineering School.
- EX and LR: schedule of lab sessions and deliverables will be made public in Campus Virtual.

The schedule can be modified due to unexpected events. Please, check Campus Virtual often since any modification will be published there.

c) Second chance procedure

- FEx: according to UAB regulations there will be one second chance exam for those students with FEx < 4 that have participated in, at least, 2/3 of the evaluation activities of the course. Taking the second chance exam implies that the student waives the grade of the previous exam.
- EX and LR: these evaluation activities do not have second chance procedure.

d) Grades revision procedure

For every evaluation activity it will be scheduled a place, date and time for reviewing the grade together with the teacher. The grade of the activity will not be modified after the scheduled date.

e) Final grade

- If FEx < 4, Final grade = FEx
- Si FEx>=4, Final grade =max(0.5*FEx + 0.2*EX + 0.3*LR, 0.7*FEx + 0.3*LR)
- It is mandatory a final grade >= 5 to pass the course
- Matricules d'honor (MH): the highest grade available can only be awarded by the coordinator of the course to those students with the top final grades. According to UAB regulations final grade should be >= 9 and the number of MH is restricted to the 5% of the students enrolled in the course.

- "Not evaluated" will be only granted with the student participates in less than 10% of the evaluation activities.

f) Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures considered appropriate, the irregularities committed by the student that can lead to a variation of the grade of an evaluation activity (such as copying plagiarizing, cheating …) will be qualified with zero.

g) Students repeating the course

There is no differential treatment for students repeating the course. No grades of the previous course will be kept.

Bibliography

C.A Balanis, Antenna Theory, 3rd edition, John Wiley & Sons, 2005

J.L. Volakis, C. Chen, K. Fujimoto, Small Antennas: Miniaturization techniques and applications, McGraw-Hill, 2010

K.L. Wong, Planar antennas for Wireless Communications, John Wiley & Sons, 2003

Software

FEKO from Altair: electromagnetic solver. https://web.altair.com/altair-student-edition

Language list

Information on the teaching languages can be checked on the CONTENTS section of the guide.