

## Circuits i Sistemes Integrats per a Comunicacions

2014/2015

Code: 42835  
ECTS Credits: 6

Degree	Type	Year	Semester
4313797 Enginyeria de Telecomunicacions / Telecommunication Engineering	OB	1	1

### Contact

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### Use of languages

Principal working language: anglès (eng)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

### Teachers

Maria Aránzazu Uranga del Monte

### Prerequisites

Recommendations: basic knowledge on electronics devices and microelectronics technology

### Objectives and Contextualisation

Provide the concepts, techniques and tools for the design and implementation of integrated systems specially those applied to the area of radiofrequency communication. The studies will cover future trends of these integrated systems in terms of design and technological predictions.

### Skills

- Capacity for critical reasoning and thought as means for originality in the generation, development and/or application of ideas in a research or professional context.
- Capacity for designing and manufacturing integrated circuits.
- Capacity for working in interdisciplinary teams
- Capacity to design communications components such as routers, commutators, concentrators, emitters and receivers in different bandwidths.
- Capacity to integrate new technologies and systems developed within telecommunications engineering in general and in broader, multidisciplinary contexts such as bioengineering, photovoltaic conversion, nanotechnology, telemedicine
- Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
- Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
- 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

### Learning outcomes

1. Analyse the function of integrated circuits for RF from the dimensions of their components
2. Capacity for critical reasoning and thought as means for originality in the generation, development and/or application of ideas in a research or professional context.
3. Capacity for working in interdisciplinary teams
4. Define the electrical characteristics of integrated RF systems according to their application
5. Identify the project objectives.
6. Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
7. Propose alternative circuits to improve the performance of the integrated circuits designed
8. Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
9. 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
10. Synthesis devices with linear responses at different bandwidth frequencies
11. Use standard tools effectively for integrated circuit design

## Content

1. Design and analysis of the basic building blocks in CMOS integrated systems for analog applications
- 2.- Design of integrated circuits for radiofrequency communication systems. Basic concepts and circuits (amplifiers, mixers and oscillators).
3. Limits and trends of the radiofrequency integrated circuits and systems

## Methodology

Theory: Oral exposition of the fundamentals concepts. Concepts will be partially introduces as specific-cases.

Problems: Resolution and discussion in relation with the proposed problems and exercises.

Laboratory: Hands-on specific design tools for integrated circuit design and simulation.

## Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
	15	0.6	1, 2, 4, 5, 7, 9, 10, 11
	15	0.6	1, 2, 4, 5, 6, 7, 8, 9, 10, 11
	15	0.6	1, 2, 4, 5, 6, 7, 9, 11
Type: Autonomous			
	25	1	1, 2, 4, 5, 7, 9, 10, 11
	30	1.2	1, 2, 4, 5, 6, 7, 8, 9
	30	1.2	1, 2, 4, 5, 7, 9, 10, 11

## Evaluation

There will be 2 written exams along the semester. Additionally there will be 2 additional homeworks which will be evaluated as oral expositions or in a written format related with the design and analysis of a specific integrated circuit. Finally the evaluation will be completed with an oral exposition of the practical work towards the design of an integrated circuit made by the students in the laboratory.

### Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
		6	0.24	1, 2, 3, 5, 6, 8, 9, 11
		8	0.32	2, 3, 6, 8, 9
		6	0.24	1, 2, 4, 5, 7, 9, 10

### Bibliography

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Design of Analog CMOS Integrated Circuits. Razavi, McGraw-Hill, 2001

RF Microelectronics. B.Razavi. Second edition. Prentice Hall, 2012

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CMOS mixed-signal circuit design. Baker, R. Jacob. Piscataway : IEEE Press ; New York : Wiley-Interscience, cop. 2009 2nd ed.

Radio frequency integrated circuit design. Rogers, John W. M. Boston : Artech House, 2010 2nd ed.

Analysis and design of analog integrated circuits . Paul R. Gray... [et al. New York [etc.] : John Wiley, cop. 2010

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Millimeter-wave integrated circuits. Eoin Carey, Springer, cop. 2005

The design of CMOS radio-frequency integrated circuits. Lee, Thomas H., 1959- Cambridge [etc.] : Cambridge University Press, 2004. 2nd ed.

High-frequency oscillator design for integrated transceivers. Tang, Johan van der. Boston [etc.] : Kluwer Academic Publishers, cop. 2003