



## UNIVERSITÀ DI PISA

### ELETTRONICA DEI SISTEMI WIRELESS

**SERGIO SAPONARA**

|                 |                        |
|-----------------|------------------------|
| Anno accademico | 2018/19                |
| CdS             | INGEGNERIA ELETTRONICA |
| Codice          | 308II                  |
| CFU             | 9                      |

|                                     |            |         |     |                                     |
|-------------------------------------|------------|---------|-----|-------------------------------------|
| Moduli                              | Settore/i  | Tipo    | Ore | Docente/i                           |
| ELETTRONICA DEI<br>SISTEMI WIRELESS | ING-INF/01 | LEZIONI | 90  | FEDERICO BARONTI<br>SERGIO SAPONARA |

#### Obiettivi di apprendimento

##### Conoscenze

The course aims to guide the student to the advanced design of radio-frequency and microwave integrated circuits for consumer applications, health care, low power RADAR etc. To this end, the most advanced CAD tools will be presented by the instructor and directly used by the students to design and simulate the main blocks of the radiofrequency front end such as LNA, Mixer, Oscillator, filters etc. The course aims to guide the student to the advanced design of radio-frequency and microwave integrated circuits for consumer applications, health care, low power RADAR etc. To this end, the most advanced CAD tools will be presented by the instructor and directly used by the students to design and simulate the main blocks of the radiofrequency front end such as LNA, Mixer, Oscillator, filters etc.

##### Modalità di verifica delle conoscenze

In the oral exam the student's ability to explain correctly the main topics presented during the course at the board will be assessed. In the laboratory report the student must demonstrate the ability to utilize a specific CAD tool (ADS) for RFIC design and simulation.

Methods:

- Final oral exam
- Laboratory report

Further information:

33% Laboratory Report (CAD design and simulation + report); 67% Oral exam

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Further information:

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##### Programma (contenuti dell'insegnamento)

Radiofrequency link dimensioning and system level considerations, integrated transceivers: available devices and technologies; design of BJT and MOS Low Noise Amplifiers, oscillators, mixer, PLL, power amplifiers; architectures for fully integrated wireless interfaces; CAD tools for RFIC design; examples of wireless integrated applications: radar on a chip, LNA with integrated antenna for millimeter waves. Radiofrequency link dimensioning and system level considerations, integrated transceivers: available devices and technologies; design of BJT and MOS Low Noise Amplifiers, oscillators, mixer, PLL, power amplifiers; architectures for fully integrated wireless interfaces; CAD tools for RFIC design; examples of wireless integrated applications: radar on a chip, LNA with integrated antenna for millimeter waves.

##### Bibliografia e materiale didattico

Il seguente testo è raccomandato; altre fonti bibliografiche di Razavi e Voinigescu sono indicate durante il corso

Thomas H. Lee "The Design of CMOS Radiofrequency Integrated Circuits", Cambridge University Press, Second Edition, 2004

Inoltre verrà fornito materiale didattico dal docente

##### Indicazioni per non frequentanti

Disponibilità a ricevimenti e supporto anche via email sulle lezioni non seguite



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### Modalità d'esame

Redazione di un progettino di design e simulazione di circuiti integrati a RF (e.g. LNA, power amplifier, Mixer) con tool ADS e poi simulazione di sistema (e.g. blocco progettato inserito in un transceiver) in Matlab/Simulink

+ prova orale per discutere del progettino e poi ulteriore domanda su aspetti più teorici del corso non coperti con il progettino

*Ultimo aggiornamento 03/09/2018 19:24*