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| Course unit title: | RF EngineeringAntennas and Radars | | |
| Course unit code: | AEEE423 | | |
| Type of course unit: | Technical Elective | | |
| Level of course unit: | Bachelor (1st Cycle) | | |
| Year of study: | 4 | | |
| Semester when the unit is delivered: | 7th (Fall) | | |
| Number of ECTS credits allocated : | 6 | | |
| Name of lecturer(s): | Dr. Symeon Nikolaou | | |
| Learning outcomes of the course unit: | 1. Compare and assess different transceiver architectures<br>2. Match passive and active components using RLC networks and distributed elements.<br>3. Develop the optimum LNA topologies considering the design parameters<br>4. Appraise the advantages and/or disadvantages of various PA topologies<br>5. Implement the use of oscillators and mixers in transceiver architectures.<br>6. Design and implement filters meeting given specifications | | |
| Mode of delivery: | Face-to-face | | |
| Prerequisites: | AEEE238 | Co-requisites: | None |
| Recommended optional program components: | None | | |
| Course contents: | • **Introduction:** R L C in high frequencies. Digital / Analogue modulation schemes S parameters.Series and parallel connection of networks. Chain scattering matrix. ABCD network representations. Conversion between Z and S matrixes<br>• **Noise and distortion:** Multistage noisy circuits. Noise temperature. Thermal noise. Noise figure<br>• **Matching networks:** Two component matching network. Quality factor. T and Pi matching networks. BJT matching networks. FET matching networks<br>• **Filters:** Filter types and parameters. Butterworth – Type filters. Chebyshev – Type filters. Microstrip filters. Coupled filters<br>• **PAs/LNAs:** Stability considerations. Stability circles. Constant gain. Noise figure circles. Constant VSWR circles. Class A and B Pas. Class C Pas.<br>• **Mixes/ Oscillators:** Feedback oscillator. Negative resistance oscillator. Single ended mixer. Single balanced mixer. Double balanced mixer<br>• **Transceiver Architectures:** Receiver architectures. Heterodyne receivers. Homodyne receivers. Transmitter architectures. Direct conversion transmitters. Two step transmitters. | | |
| Recommended and/or required reading: | | | |
| Textbooks: | David Pozar, Microwave and RF Design of Wireless Systems, John Wiley and Sons, 2001.<br>Reinhold Ludwig and Gene Bogdanov, “RF Circuit Design Theory and Applications”, Second Editon, Pearson International Edition | | |
| References: | Behzad Razavi, “RF Microelectronics”, Prentice Hall.<br>Joseph F. White, “High Frequency Techniques: An Introduction to RF and Microwave Engineering”, IEEE Press, 2004<br>Kai Chang, “RF and Microwave Wireless Systems”, Wiley 2000 | | |

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| Planned learning activities and teaching methods: | The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks. The structure of the course teaching is based on lectures (3 hours per week) in a classroom.<br><br>During the lectures several related exercises are solved on the board with participation of the students. Several problems are left unfinished for the students to complete at home. Other problems are used as assignments. Topic notes are compiled by students, during the lecture which serve to cover the main issues under consideration. Students are also urged to use the textbook assigned to the course. Related homework problems are also assigned from the textbook as a turn in assignment or for homework practice. Also, students are advised to use the reference books for further reading and practice in solving related exercises. |
| Assessment methods and criteria: | • Assignments 10%<br>• Tests: 30%<br>• Final Exam 60% |
| Language of instruction: | English |
| Work placement(s): | No |