

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING  
COURSE SYLLABUS

**Course Name:** ECEN 689  
**Course Title:** Special Topics in Advanced Mixed-Signal Interfaces

**Catalog Description:**

**690. Special Topics In... Credit 1 to 4.** Introduction to state of the art mixed-signal interfaces such as transmitters and receivers front-ends in wireless and wireline communications transceivers. Introduction to background and foreground calibration techniques for digitally-assisted transceivers.

**Prerequisite(s):** ECEN-610 ECEN474 or Approval of Instructor

**Reference Text(s):**

- [1] IEEE Transactions Journals on some key topics
- [2] The design of CMOS Radio-Frequency Integrated Circuits, Thomas H. Lee
- [3] Low-voltage Low Power Integrated Circuits, E. Sanchez-Sinencio, A. Andreou, IEEE Press, 1999
- [4] A. B. Grebene. Bipolar and MOS Analog Integrated Circuit Design, John Wiley & Sons, Inc., New York 1984
- [5] B. Razavi, Principles of Data Conversion System Design, IEEE Press, 1995
- [6] Gregorian et al., Analog MOS Integrated Circuits for Signal Processing, Wiley, 1986
- [7] Van de Plassche, CMOS Integrated Analog-to-digital and Digital-to-analog Converters, Kluwer, 2003.
- [8] Norsworthy et al., Delta-Sigma Data Converters: Theory, Design, and Simulation, Wiley, 1996
- [9] Gray, et al., Analysis and Design of Analog Integrated Circuits (4<sup>th</sup> Ed.), Wiley, 2001
- [10] Rodriguez-Vazquez, Mediro, Janssens, CMOS Telecom Data Converters, Kluwer
- [11] Schreier, Temes, Understanding Delta-Sigma Data Converters, Wiley-IEEE Press

**Course Objectives:** At the end of this course, students should:

1. Understand the design specifications and implementation details of mixed-signal interfaces such as transmitters and receivers front-ends in wireless and wireline communications transceivers.
2. Understand the design specifications and implementation details of background and foreground calibration techniques for digitally-assisted transceivers.
3. Understand the design specifications and implementation details of emerging and state of the art mixed-signal techniques for the design of narrowband, wideband and ultra-wideband transmitters and receivers.
4. Understand the challenges and some of the topologies proposed to realize concepts such as Software-Defined-Radios and Cognitive-Radios.

**Course Topics and Hours:**

Unit	Topic	Hours
1	Transmitter Topologies and DACs	9
2	Receiver Topologies and ADCs	9
4	Digitally-Assisted Transceivers: Calibration Techniques	8
5	Narrow-Band, Wideband and Ultra-wideband Radios	6
6	Software Defined Radios	3
7	Cognitive Radios	3
<b>Total Hours</b>		<b>38</b>

**Lecture Schedule** – 3 meetings / week, 50 minutes each or 2 meetings / week 75 minutes each

**Grading Policy:**

Homework	15%	Biweekly
Lab	10%	
Midterm 1	20%	In class
Midterm 2	20%	In class
Final Project	15%	Assigned after midterm
Project Presentation		In Class
Final Exam	20%	University Schedule
<b>TOTAL</b>	<b>100%</b>	

## DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING COURSE SYLLABUS

- **There will be no individual make-up exams except for emergency cases acceptable to the instructor.**

- **Late homeworks will not be accepted.**

- **Americans with Disabilities Act (ADA) Policy Statement:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room 126 of the Koldus Building or call 845-1637.

- **An Aggie does not lie, cheat, or steal or tolerate those who do.**

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