



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Fundamentals of Integrated Data Converters

ECE 5023

Credit Hours:

3.00

Course Levels:

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

This course focuses on fundamentals of Nyquist-rate and oversampled (Delta-Sigma) integrated data converters, including system and circuit architectures, performance metrics and characterization, practical implementations, and design considerations in advanced semiconductor processes.

Prerequisites and Co-requisites:

Prereq: 4021, or Grad standing in Engr or Physics.

Course Goals / Objectives:

- Be competent in the specifications and performance metrics of analog-to-digital (ADC) and digital-analog (DAC) data converters and how they are analyzed and simulated.
 - Be competent in data converters performance trade-offs, such as power consumption, silicon area, sampling rate, and resolution.
 - Be familiar with the basic circuit topologies and circuit design procedure of the most common Nyquist-rate and oversampling (Delta-Sigma) ADCs and DACs and their applications in wireless transceivers.
 - Be competent in the use of modern integrated circuit design CAD tools for the design and simulations of data converter building blocks.
 - Be competent in writing design project reports.
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Course Topics:

- Introduction to data converter ideal operation, quantization noise characteristics
 - Data converter performance metrics
 - Data converter performance limitations and errors
 - Fundamentals of spectral analysis and FFTs and data converter simulation
 - Nyquist-rate ADC architectures and circuit design
 - Oversampling (Delta-Sigma) ADC architectures and circuit design
 - Nyquist-rate DAC architectures and circuit design
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Designation:

Elective