

INTRODUCTION OF NEW COURSE

Course Title	VLSI DATA CONVERSION CIRCUITS	Course No				
Specialization	Electronics Engineering	Structure (LTPC)	3	0	0	3
Offered for	UG/PG/PhD	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty	Dr. Binsu J Kailath	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Pre-requisite	--	To take effect from	May 2015			
Submission date	April 2015	Date of approval				
Objectives	This course introduces the basics of Analog to digital and digital to analog conversion circuits in VLSI. After familiarizing with the basics of data converters, the students are introduced to Switched capacitor circuits and Flash ADCs. Need and benefits of oversampling approach and delta sigma modulators are discussed in detail. As these circuits are essential building blocks for any real time signal processing systems, this course would help them to design such systems for a set of specifications.					
Contents of the course	<p>Sampling, over sampling, time interleaved sampling, sample and hold circuits, distortion, thermal noise, charge injection(6)</p> <p>Switched capacitor circuits, non idealities, fully differential SC circuits (5)</p> <p>ADC terminology offset and gain error, non linearity, dynamic characterization, quantization noise (4)</p> <p>Flash ADC, regenerative latch, preamp, offset correction, differential pre amp, pre amp design, timing issues(7)</p> <p>DAC basics, architectures, binary weighted DAC, current steering DAC (4)</p> <p>Over sampling approach, signal and noise transfer functions, Delta Sigma converters, stability in Delta sigma modulators (6)</p> <p>Continuous time delta sigma modulators, anti aliasing property, effect of opamp non-idealities, loop filter(10)</p>					
Text and References	<p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. CMOS Data Converters for Communication, M. Gustavsson, J.J. Wikner and N.N. Tan, Kluwer Academic Publishers, ISBN-0-792-37780-X, 2002</li> <li>2. Principles of Data Conversion System Design by Behzad Razavi, ISBN-978-0-7803-1093-3, Wiley-IEEE Press, 1994</li> </ol> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Delta-Sigma Data Converters: Theory, Design, and Simulation by Steven R. Norsworthy, Richard Schreier, Gabor C. Temes, Wiley-Blackwell, ISBN-13: 978-0780310452, 1996</li> <li>2. Understanding Delta-Sigma Converters – by Richard Schreier, Gabor C. Temes</li> <li>3. IEEE Journal of Solid State Circuits for the state of the art circuits</li> </ol>					