**ECL 310: CMOS DESIGN SYLLABUS**

**Course Outcomes:**

* To introduce the fundamental principles of VLSI (Very Large Scale Integrated) circuit design and layout.
* To provides an overview of CMOS fabrication technologies, physical VLSI design issues (bottom-up design), basic CMOS logic gates, architectural building blocks and system design (top-down design), with a stronger emphasis on physical design principles.
* To cover the basic building blocks of large-scale CMOS digital integrated circuits, and to provide hands-on design experience using a professional IC design platform.

**CMOS Design Introduction:**

Flow of circuit design, Fabrication Process Flow: Basic Steps, Layout Design Rules

**CMOS Digital Circuits:**

Inverters, Static logic gates, Transmission gates and Flip-Flops, Dynamic logic Gate. Memory Circuits.

**CMOS Analog Circuits:**

MOS Analog models, Current Sources and sinks, References, amplifiers, Differential Amplifiers, Operational Amplifiers.

CMOS Mixed- Signal Circuits:

**Data converter:**

Fundamentals and Converter architectures.

**REFERENCE BOOKS**

1. Behzad Razavi, “Fundamentals of Microelectronics”, 2nd Edition, March 2014.
2. Behzad Razavi. 2000. Design of Analog CMOS Integrated Circuits (1 ed.). McGraw-Hill, Inc., New York, NY, USA.
3. “CMOS Circuit design, Layout and Simulation”, R. J. Baker, H W Li, D.

E. Boyce, PHI EEE

1. “Principles of CMOS VLSI Design”, Neil H. E. Weste, Kamran Eshraghian, Addison Wesley
2. “Basics of CMOS Cell Design”, Etienne Sicard
3. “CIRCUIT DESIGN for CMOS VLSI”, John P. Uyemura
4. “CMOS Circuit Design, Layout, and Simulation”, R. Jacob Baker, 3E.
5. “CMOS DIGITAL INTEGRATED CIRCUITS: Analysis and Design,” SUNG-MO (STEVE) KANG and YUSUF LEBLEBICI

**ONLINE VIDEOS:**

1. “Electronic Circuits I” by Dr. Behzad Razavi, Professor, UCLA.  
   <https://www.youtube.com/watch?v=yQDfVJzEymI>
2. “Analog IC Design” by Dr. Nagendra Krishnapura, Department of Electronics & Communication Engineering, IIT Madras  
   <https://www.youtube.com/playlist?list=PLbMVogVj5nJRlMz5diOg9wBizaU6-egJc>
3. “CMOS Circuit Design, Layout, and Simulation” by R. Jacob Baker

[www.cmosedu.com/videos/](http://www.cmosedu.com/videos/)