

Department of Electrical and Computer Engineering  
 EENG 406  
 INTRODUCTION TO INTEGRATED CIRCUIT ENGINEERING



Required     Elective

AY	Revision History: Changes and Rationale	Progress Exam Affected?
07/08	Syllabus Created	N
11/12	Syllabus Updated	N

**Coordinator:** Claudio Talarico, Professor, Electrical and Computer Engineering

**Catalog Description:** *Structural design of digital integrated circuits in MOS technology; layout, design rules, fabrication techniques; use of computer automated design and simulation tools, and high-level description language. Three hours lecture per week. Prerequisites: CPEN 231 and EENG 304.*

**Prerequisites by Topic:**

1. Microcomputer programming and architecture
2. Electronics

**Textbook(s) / Require Mat'l:** *CMOS VLSI Design* by N.E. Weste and D. Harris, Addison Wesley, 4<sup>th</sup> Edition, 2011

**Course Topics:**

1. MOS transistors (10%)
2. MOS processing (10%)
3. Circuit characterization and performance (10%)
4. CMOS circuit design (15%)
5. Structured design (10%)
6. Design examples (10%)
7. CAD and symbolic layout (15%)
8. Hardware description language (10%)
9. Tests and Review (10%)

**Course Objectives:**

1. To teach students the basics of MOS devices and integrated circuit design
2. To provide students an understanding of IC layout techniques and CAD tools
3. To provide students an understanding of IC fabrication techniques
4. To teach students the use of hardware description language for design and simulation

<b>Professional Components/ Course Outcomes:</b>	<p><i>By the end of this course the student will be able to:</i></p> <ol style="list-style-type: none"> <li>1. demonstrate knowledge of MOS devices and integrated circuit design.</li> <li>2. demonstrate knowledge of IC layout techniques.</li> <li>3. demonstrate knowledge of IC design software and methods.</li> <li>4. demonstrate ability to utilize commercial computer software to implement IC layout.</li> <li>5. demonstrate ability to utilize hardware description language for design and simulation.</li> </ol>
--	---

<b>Class/Lab Schedule:</b>	150 minutes of lecture each week; 3 x 50 minute or 2 x 75 minute sessions 3 credit hours
----------------------------	---

<b>Relation to Program Outcomes:</b>	<input checked="" type="checkbox"/> (a) Fundamental math, science, or engineering	<input type="checkbox"/> (b) <i>Experimentation</i>
	<input checked="" type="checkbox"/> (c) Design	<input type="checkbox"/> (d) Teamwork
	<input type="checkbox"/> (e) Professional ethics	<input checked="" type="checkbox"/> (f) <i>Problem solving</i>
	<input type="checkbox"/> (g) Life-long learning	<input type="checkbox"/> (h) <i>Global awareness</i>
	<input type="checkbox"/> (i) Contemporary issues	<input checked="" type="checkbox"/> (j) <i>Modern tools</i>

<b>Computer Tools:</b>	Software used includes Synopsys HSPICE, Synopsys Design Compiler and Synopsys Galaxy.
------------------------	---

<b>Laboratory Content:</b>	None
----------------------------	------

<b>Design Content:</b>	Design issues are addressed.
------------------------	------------------------------

<b>Relation to Curriculum:</b>	Curricular Component	<input type="checkbox"/> Elect. Power/Power Syst.	<input type="checkbox"/> Computer
	<input type="checkbox"/> Math/Science	<input checked="" type="checkbox"/> EM/Circuits/Elect./Filters	<input type="checkbox"/> Controls/Automation
	<input type="checkbox"/> Design	<input type="checkbox"/> Comm. Syst./Signal Proc.	<input type="checkbox"/> Other Engineering
	<input type="checkbox"/> Foundational	<input type="checkbox"/> Intermediate	<input checked="" type="checkbox"/> Advanced