

University of Puerto Rico  
 Mayagüez Campus  
 College of Engineering  
 Department of Electrical and Computer Engineering  
 Graduate Program in Electrical Engineering

**Course Syllabus**

<b>1. General Information:</b>	
Alpha-numeric codification: INEL 6080 Course Title: VLSI SYSTEMS DESIGN Number of credits: 3 Contact Period: 3 hours of lecture per week	
<b>2. Course Description:</b>	
English: MOS (Metal-Oxide-Semiconductor) devices and circuits. Design, implementation, and fabrication of very large scale integration (VLSI) circuits. System timing analysis. Physical implementation of computational systems.	
Spanish: Diseño, Análisis, implementación y fabricación de circuitos de alto número de compuertas (VLSI). Analisis transiente del sistema. Implementación física de sistemas computacionales	
<b>3. Pre/Co-requisites and other requirements:</b>	
Graduate Level or professor authorization for advanced undergraduates.	
<b>4. Course Objectives:</b>	
This course is intended to provide students an understanding of various contemporary techniques for the design, simulation, and fabrication of CMOS VLSI Digital circuits. Students will get in touch with current research in these areas at the same time that use state of the art CAD tools for evaluating, and analyzing practical circuits developed as part of the class.	
<b>5. Instructional Strategies:</b>	
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input checked="" type="checkbox"/> laboratory  <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop  <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input checked="" type="checkbox"/> special problems <input type="checkbox"/> tutoring  <input checked="" type="checkbox"/> research <input type="checkbox"/> other, please specify:	
<b>6. Minimum or Required Resources Available:</b>	
ICDL provides the required CAD resources needed for the course	
<b>7. Course time frame and thematic outline</b>	
<b>Outline</b>	<b>Contact Hours</b>
1. Introduction	1.5
2. Logic Design with MOSFETS	1.5
3. Introduction to HDLs	3
4. Physical Structure of CMOS ICs	1.5
5. Fabrication Process CMOS ICs	1.5
6. Elements of Physical Design	1.5
7. Review of MOS Transistor Theory	3

8.	Analysis of CMOS Logic Gates	4.5
9.	Design of High-speed CMOS Gates	4.5
10.	Advanced CMOS Techniques	4.5
11.	VLSI System Components	3
12.	CMOS VLSI Arithmetic Components	4.5
13.	System-level VLSI Design	4.5
14.	Reliability and Testing of VLSI Circuits	3
15.	Tests	3
<b>Total hours: (equivalent to contact period)</b>		<b>45</b>

### 8. Grading System

Quantifiable (letters)  Not Quantifiable

### 9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2	40%
<input type="checkbox"/> Final Exam		
<input checked="" type="checkbox"/> Short Quizzes	1	10%
<input checked="" type="checkbox"/> Oral Reports	1	25%
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	1	25%
<input type="checkbox"/> Journals		
<input type="checkbox"/> Other, specify:		
<b>TOTAL:</b>		<b>100%</b>

### 10. Bibliography:

Textbook: J. P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, Inc., New York, NY 10158-0012, 2002

#### References

1. N. Weste and D. Harris, CMOS VLSI Design: A Circuits and Systems Perspective , Third Ed., Addison-Wesley Publishing 2004
2. R.J. Baker, D.E. Boyce, S.K. Tewksbury, and J.E. Brewer, CMOS: Circuit Design, Layout, and Simulation, John Wiley, 2004
3. J. Rabaey, A. Chandrakasan, and B. Nikolic, "Digital Integrated Circuits: A Design Perspective, 2nd Edition", Prentice Hall, Inc., 2003.
4. Hastings, "The Art of Analog Layout", Prentice Hall, Inc., 2001.
5. J. Rabaey, A. Chandrakasan, B. Nikolic, "Digital Integrated Circuits: A Design Perspective, 2nd Edition", Prentice Hall, Inc., 2003.
6. Technical papers from journals and conferences in Circuits and Systems and Computer Aided Design of Electronic Circuits.

### 11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

### Person who prepared this description and date of preparation:

Manuel Jiménez, August 2007