LEARNING OBJECTIVE

The objective of this course is to provide students with a basic understanding of the integrated-circuit (IC) devices, namely the bipolar transistor and MOSFET. Some second order transistors’ effects will be discussed. The basic silicon devices processes, the working principle of CMOS logic circuits (both static and dynamic) as well as the consideration for power will all be covered. Following the basic devices, the BiCMOS devices that is used in niche areas of digital IC design, will be discussed. The issues of low voltage and low power, as well as the sensitivity analyses of BiCMOS digital circuits will all be presented. The layout design rules is also covered in the course before introducing the Sub-System Design in Digital Circuits.

In the Design Methodologies topic, the concepts on design flow, design analysis, verification, different implementation approaches, design synthesis and test methods are discussed. The objective is to provide the students with clear concepts on these topics.

All of these topics serves as important background to our present day devices and help to form a strong foundation for the learning of future newly developed semiconductor devices and their applications. Finally, this course together with the Analog IC Design course provide a comprehensive study of integrated circuit design for graduate students.

CONTENT


LEARNING OUTCOME

Students are expected to achieve a basic understanding of transistor device physics, as well as the secondary effects of these devices. They should be able to draw the layout for a block of CMOS circuit at the end of the course. The working mechanism of CMOS circuits (both static and dynamic) as well as the consideration for low power design should be better appreciated. Finally, they should be able to analyze and design digital CMOS circuits with high speed and more importantly, low power considerations. Finally, digital sub-system design is covered to enable students to scale up from devices and circuits to digital functional modules and more complex digital integrated systems with low power consumption.
OTHER RELEVANT INFORMATION

This course is intended for graduate students. The prerequisites for understanding the course are: a bachelor degree in Physics or in Electrical and/or Electronic engineering.

ASSESSMENT SCHEME

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<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tr>
<td>Continuous Assessment</td>
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<tr>
<td>Final Examination</td>
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TEXTBOOKS


REFERENCES