國立東華大學

課　綱　Course Outline

電機工程學系學士班半導體工程組

中文課程名稱 Course Name in Chinese	超大型積體電路設計導論(一)				
英文課程名稱 Course Name in English	Intorduction to VLSI Design (I)				
科目代碼 Course Code	EE__33710	班　別 Degree	學士班 Bachelor's		
修別 Type	學程 Program	學分數 Credit(s)	3.0	時　數 Hour(s)	3.0
先修課程 Prerequisite	數位邏輯設計				

課程目標
Course Objectives

銜接數位邏輯設計的觀念，使學生了解CMOS製程、元件特性、實體結構與電路佈局，並完成數位邏輯電路分析與網路設計，建立VLSI系統設計之基礎。(Integrating the principles of digital logic design, this course enables students to understand CMOS manufacturing processes, the characteristics of electronic devices, and explore physical structures and circuit layouts. It also guides them in performing digital logic circuit analysis and network design, thereby establishing a foundation for VLSI system design)

系教育目標
Dept.'s Education Objectives

1	專業人才培育—奠立學生專業知能，培育產業技術人才。 To cultivate talents with basic professional knowledge
2	團隊合作訓練—落實分工合作觀念，具備溝通服從能力。 To train students with teamwork ability
3	創新思維啟發—具備自我學習能力，啟發創新思維模式。 To inspire students with creative thinking
4	多元學習規劃—訓練觸類旁通思維，培養基本科技英文閱讀溝通能力。 To plan courses with multi-learning modes

系專業能力 Basic Learning Outcomes	課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A　培育具備工程、應用數學與物理科學等數理知識之基本能力。 To cultivate the basic knowledge of engineering, applied mathematics and physics.	●

B	培育系統分析、模擬驗證、實作實現之能力。 To cultivate the basic ability of analysis, verification and implementation of systems.	●
C	訓練軟體工具使用與硬體實務驗證相互輔助之能力。 To train the auxiliary ability between the utilization of software tool and the verification of the hardware practice.	●
D	訓練電機本知學能技術與工程實務相互結合運用之能力。 To train the integrate ability between professional instinct in learning technique and engineering practice.	●
E	落實專題製作之群體合作與團隊競爭之能力。 To fulfill the ability of group cooperation and teamwork competition.	●
F	落實發掘問題、邏輯分析、克服瓶頸與持續學習之能力 To fulfill the ability of question finding, logical analyzing, bottleneck overcoming and continuous learning.	●
G	了解學術倫理與智慧財產觀念，掌握產業更迭需求與具備多元專長之能力。 To obtain the ability of multi-specialization and to meet the industry demand as well as to have the ability of academic ethics and concept of intellectual property	○
H	了解國內外市場變化，具備基本科技英文閱讀溝通之能力。 To understand the change of global market and the have the basic ability of reading and conversation in English.	○

圖示說明Illustration ：● 高度相關 Highly correlated ○中度相關 Moderately correlated

課程大綱
Course Outline

1. An Overview of VLSI
2. Logic Design with MOSFETS
3. Physical Structure of CMOS Integrated Circuits
4. Fabrication of CMOS Integrated Circuits
5. Elements of Physical Design
6. Electrical Characteristics of MOSFETs
7. Electronic Analysis of CMOS Logic Gates
8. Designing High-Speed CMOS Logic Networks
9. General VLSI System Components
10. Arithmetic Circuits in CMOS VLSI
11. Memories and Programmable Logic
12. Reliability and Testing of VLSI Circuits

資源需求評估（師資專長之聘任、儀器設備的配合···等）
Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

課程要求和教學方式之建議
Course Requirements and Suggested Teaching Methods

1. Homework
2. Midterm Exam
3. Final Exam

其他
Miscellaneous

Textbook:
John P. Uyemura, Introduction to VLSI Circuits and Systems, 1st ed., John Wiley &

Sons, 2002

Reference:
1. John P. Uyemur 原著，李世鴻編譯， VLSI電路與系統，2006年，初版三刷，全華圖書（ISBN-13：978-9572142103）
2. Neil H. E. Weste & David Harris 原著，周世傑編譯，CMOS VLSI 設計原理(基礎篇)，初版一刷，偉明圖書(ISBN-13：978-986-154-827-2)