國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	數位積體電路設計			學年/學期 Academic Year/Semester	114/1
課程名稱(英文) Course Name in English	Digital Integrated Circuit Design				
科目代碼 Course Code	EE__53700	系級 Department & Year	碩士	開課單位 Course-Offering Department	電機工程學系
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/翁若敏				
先修課程 Prerequisite					

課程描述 Course Description

課程內容包含半導體製程、元件模型、電路設計、製造測試等相關議題。一分面可建立有關超大型積體電路設計的基礎入門知識，另一方面可了解底層標準元件電路知識，也能結合混合訊號及類比電路設計建立高速電路系統之設計參考。
內容除半導體製程演進介紹外，亦採用短通道電晶體模型來推導相關電路特性。以虛擬 nMOS 反相器替代，以符合現今主流的次微米／奈米製程電路設計。記憶體增加低電壓 SRAM介紹； BiCMOS 則改為算術運算單元電路介紹；時脈產生章節也增加鎖相迴路與延遲鎖定迴路簡介。

課程目標 Course Objectives

學習數位電路之基本理論及實際設計之考量，進而熟悉CMOS VLSI 之數位電路
設計方法

	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	培育具備電機電子資訊工程等專業技術研發之能力。To cultivate the research and developing ability of electrical, electronics and information engineering。	●
B	培育系統分析、模擬驗證、實作實現之能力。To cultivate the advanced 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	訓練電機電子資訊專業知識與工程實務相互結合運用之能力。To train the integrate ability between professional EECS knowledge and engineering practice。	●
E	落實論文研究之群體討論與團隊合作之互助能力。To fulfill the research ability in thesis by group discussion and teamwork cooperation。	○
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，掌握國內外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，具備科技英文閱讀溝通與科技論文寫作之能力。To understand the change of global market and to have the ability of reading, conversation and technical writing in English。	○

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

授 課 進 度 表 Teaching Schedule & Content

週次Week	內容 Subject/Topics	備註Remarks

1	1 Introduction	
2	2 Fabrication of MOSFETS	
3	3 MOS Transistor	
4	4 Modeling of MOS Transistors Using SPICE	
5	5 MOS Inverters: Static Characteristic	
6	6 MOS Inverters: Switching Characteristics and Interconnect Effects	
7	7 Combinational MOS Logic Circuits	
8	8 Sequential MOS Logic Circuits	
9	9 Dynamic Logic Circuits	
10	期中考試 Mid Exam	
11	10 Semiconductor Memories	
12	11 Low-Power CMOS Logic Circuits	
13	12 Arithmetic Building Blocks	
14	13 Clock (I/O) Circuits	
15	14 Design for Manufacturability	
16	15 Design for Testability	
17	Design Using V erilog	
18	期末考試 Final Exam	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture ☐ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous:

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☑ 問題導向學習(PBL) ☐ 團體合作學習(TBL) ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other: _____

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)	0%								
期中考成績 Midterm Exam	40%								
期末考成績 Final Exam	40%	✓							
作業成績 Homework and/or Assignments	10%	✓							
其他 Miscellaneous (出席率)	10%								

評量方式補充說明
Grading & Assessments Supplemental instructions

出席率採取倒扣方式,線上點名未到一次扣總分2分，遲到者扣一分。

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

(1)Sung-Mo Kang , etc. "CMOS Digital Integrated Circuits Analysis and Design", 4/e,McGraw-Hill Education, 2014.
(2)Jan M Rabeay, etc."Digital Integrated Circuits A Design Perspective",Prentice Hall.2016.

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information. Personal website can be listed here.)

(1)投影片與補充講義下載位址：東華e學苑
(2)採Zuvio線上點名,需開啟手機GPS定位。

其他補充說明 (Supplemental instructions)