教學大綱表

(電機工程研究所) (106 學年度)

課程名稱： (中文)	前瞻類比積體電路設計	開課單位	電機工程學系
(英文)	Advanced Analog Integrated Circuit Design	課程代碼	4155525_01

授課教師： 蔡宗亨					
學分數	3	必/選修	選修	開課年級	研究所

先修科目或先備能力：電子學 I ~ III, 類比積體電路設計, 混合訊號積體電路設計

課程概述：Analysis and design of advanced analog CMOS integrated circuits. This course covers important topics in analog IC designs not sufficiently taught in an introductory course, including a rigorous treatment of noise, feedback, and distortion in analog circuits.

課程目標：This course is designed to bridge the separation of introductory material on integrated circuit analysis and performance-driven design. Students will acquire a deep understanding of the fundamental effects that limit the performance of the emerging electronic systems. Students will also learn about all aspects of chip design/implementation, including design procedure, evaluating alternate designs, transistor-level simulations, and system architectures.

教科書	1. Analysis and Design of Analog Integrated Circuits, 5th Edition ~Gray, Hurst, Lewis, Meyer 2. Design of Analog CMOS Integrated Circuits ~Razavi

課程大綱		分配時數				核心能力
單元主題	內容綱要	講授	示範	習作	其他[1]	
CMOS Device Physics	**topic：C**MOS Device technology **task:** Circuit model extraction and analysis **goals:** Experience the device model and circuit simulator (HSPICE)	50%	30%	20%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1
CMOS Amplifiers Design	**topic：**Amplifier design example and simulation **task:** Hand calculations and circuit simulations **goals:** Quantitative evaluations of performance	50%	30%	20%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1
Noise	**topic：**Analytical and approximate treatments of noise **task:** Noise analysis in feedback circuit **goals:** Experience circuit technique for noise treatments	50%	30%	20%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1
Broadband Gain Stages	**topic：**Broadband Operational amplifiers design example **task:** Divide students into some group to learn how to design broadband gain stages respectively.	40%	30%	30%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1

Continuous-time Filters	**topic**：Design example for continuous-time fitlers **task:** Analysis of the frequency response and power consumption of continuous-time filters	50%	30%	20%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1
Mixed-Signal IC Layout (Noise Analysis, R/L/C Layout, SC Circuit Layout, Design Example)	**Topic**：Mixed-signal IC layout (ex. SC circuit) **task:** Study the back-end design technique of IC, **goals:** Experience the mixed-signal layout and full-custom flow	20%	40%	40%		1.1, 1.2, 1.3, 2.1, 2.2, 4.1

教學要點概述[2]：

教材編選：■自編教材　□教科書作者提供

教學方法：■投影片講述　■板書講述　■實例示範　■操作練習

評量方法：■期中考(30%)■期末考(35%)■專題(35%)

教學資源：■課程網站　■教材電子檔供下載　■其他:教學課程平台/線上討論區

教學相關配合事項：_____

核心能力

●1.1 ●1.2 ●1.3 ○1.4 ●2.1 ● 2.2 ○3.1 ○3.2 ○3.3 ●4.1 ○4.2 ○4.3 ○4.4

1.1 學習電機工程特定領域之理論基礎。

1.2 瞭解電機工程特定領域之實務技術。

1.3 培養特定領域電機工程系統之研發能力。

1.4 訓練專業論文寫作與簡報的能力。

2.1 培養發掘、分析、規劃與執行電機工程特定領域專題研究之能力。

2.2 運用現有知識，學習獨立處理問題並進行跨領域創新研發。

3.1 學習溝通與表達的能力。

3.2 訓練運用個人專長配合團隊要求，與團隊成員合作達成專案計畫的目標。

3.3 培養規劃、領導及管理合作團隊的能力。

4.1 瞭解國內外電機工程特定領域之學術與產業的發展與需求。

4.2 養成持續自我學習的習慣與能力。

4.3 理解工程倫理及社會責任。

4.4 培養良好的國際觀。

註： 1. 其他欄包含參訪、專題演講等活動。

2. 教學要點請填寫教材編選、教學方法、評量方法、教學資源、教學相關配合事項