

淡江大學 99 學年度第 1 學期課程教學計畫表

課程名稱	進階數位信號處理	授課 教師	詹益光 Yih-guang Jan
	ADVANCED DIGITAL SIGNAL PROCESSING		
開課系級	電機一博士班 A	開課 資料	選修 單學期 3學分
	TETXD1A		
學系(門)教育目標			
<p>一、教育學生具備電機 / 機器人工程專業知識以解決電機之相關問題。</p> <p>二、教育學生具備創新思考、能獨立完成所交付任務及具備團隊精神之高級工程師。</p> <p>三、教育學生具備前瞻的國際觀及全球化競爭技能以因應現今多元化職場生涯之挑戰。</p>			
學生基本能力			
<p>A. 具有運用專業知識以解決電機工程問題之能力。</p> <p>B. 具有策劃及執行專題研究之能力。</p> <p>C. 具有撰寫專業論文之能力。</p> <p>D. 具有創新思考及獨立解決問題之能力。</p> <p>E. 具有與不同領域人員協調整合之能力。</p> <p>F. 具有前瞻的國際觀。</p> <p>G. 具有領導、管理及規劃之能力。</p> <p>H. 具有終身自我學習成長之能力。</p> <p>I. 具有智慧財產權及職場倫理之正確認知。</p>			
課程簡介			
	<p>This book is an introduction to the theory and algorithms used for the analysis and processing of random signals and their applications to real-world problems. We will focus on the key topics of spectral estimation, signal modeling, adaptive filtering, and array processing. The principal objectives are to provide an introduction to basic concepts and methodologies that can provide the foundation for further study, research, and application to new problems.</p>		

本課程教學目標與目標層級、學生基本能力相關性

一、目標層級(選填)：

- (一)「認知」(Cognitive 簡稱C)領域：C1 記憶、C2 瞭解、C3 應用、C4 分析、C5 評鑑、C6 創造
- (二)「技能」(Psychomotor 簡稱P)領域：P1 模仿、P2 機械反應、P3 獨立操作、P4 聯結操作、P5 自動化、P6 創作
- (三)「情意」(Affective 簡稱A)領域：A1 接受、A2 反應、A3 重視、A4 組織、A5 內化、A6 實踐

二、教學目標與「目標層級」、「學生基本能力」之相關性：

- (一)請先將課程教學目標分別對應前述之「認知」、「技能」與「情意」的各目標層級，惟單項教學目標僅能對應C、P、A其中一項。
- (二)若對應「目標層級」有1~6之多項時，僅填列最高層級即可(例如：認知「目標層級」對應為C3、C5、C6項時，只需填列C6即可，技能與情意目標層級亦同)。
- (三)再依據所訂各項教學目標分別對應該系「學生基本能力」。單項教學目標若對應「學生基本能力」有多項時，則可填列多項「學生基本能力」(例如：「學生基本能力」可對應A、AD、BEF時，則均填列)。

序號	教學目標(中文)	教學目標(英文)	相關性	
			目標層級	學生基本能力
1		The principal goal of this course is to provide a unified introduction to the theory, implementation, and applications of statistical and adaptive signal processing methods. It will be focused on the key topics of spectral estimation, signal modeling, adaptive filtering, and array processing. The principal objectives are to provide an introduction to basic concepts and methodologies that can provide the foundation for further study, research, and application to new problems.	C3	ABCDEFGH

教學目標之教學策略與評量方法

序號	教學目標	教學策略	評量方法
1		課堂講授	報告、期中考、期末考

授課進度表

週次	日期	內容 (Subject/Topics)	備註
1	09/13	1. Signal Terminology 2. Analog to Digital Conversion 3. Measure of Signal Properties	Introduction
2	09/20	1. Model development 2. Generalized Least Squares 3. Generalities 4. Models from Linearization 5. Orthogonal Polynomials 6. Interpolation & Extrapolation	Empirical Modeling and Approximation

3	09/27	1. Fourier Series 2. Fourier Transformation 3. Discrete Fourier Transform 4. Fourier Analysis 5. Procedural Summary 6. Selected Applications	Fourier Analysis
4	10/04	1. Fourier Series 2. Fourier Transformation 3. Discrete Fourier Transform 4. Fourier Analysis 5. Procedural Summary 6. Selected Applications	Fourier Analysis
5	10/11	1. Random variables 2. Joint probability 3. Sampling and estimation 4. Density function estimation 5. Correlation and regression 6. Estimators 7. Random numbers and signal characteristics	Probability Concepts and Signal Characteristics
6	10/18	1. Random variables 2. Joint probability 3. Sampling and estimation 4. Density function estimation 5. Correlation and regression 6. Estimators 7. Random numbers and signal characteristics	Probability Concepts and Signal Characteristics
7	10/25	1. Stationarity 2. Moment functions 3. Time average and ergodicity 4. Estimating correlation functions 5. Correlation and signal structure 6. Assessing stationarity of signals	Random processes and signal properties
8	11/01	1. Stationarity 2. Moment functions 3. Time average and ergodicity 4. Estimating correlation functions 5. Correlation and signal structure 6. Assessing stationarity of signals	Random processes and signal properties
9	11/08	期中考試週	
10	11/15	1. Power spectra 2. System definition review 3. System and signal structure 4. Time series models for spectral density.	Random signals, Linear systems and power spectra
11	11/22	1. Spectral estimation concepts 2. Sampling distribution for spectral estimators 3. Consistent estimators- direct methods 4. Consistent estimators- indirect methods 5. Autocorrelation estimation	Spectral analysis for random signals: Nonparametric methods
12	11/29	1. Spectral estimation concepts 2. Sampling distribution for spectral estimators 3. Consistent estimators- direct methods 4. Consistent estimators- indirect methods 5. Autocorrelation estimation	Spectral analysis for random signals: Nonparametric methods
13	12/06	1. Model development 2. Random data modeling approach 3. Power spectral density estimation	Random signal modeling and parametric spectral estimation
14	12/13	1. Model development 2. Random data modeling approach 3. Power spectral density estimation	Random signal modeling and parametric spectral estimation
15	12/20	1. Properties of cross correlation functions 2. Detection of time-limited signals 3. Cross spectral density functions 4. Applications 5. Tests for correlation between time series	Theory and application of cross correlation and coherence
16	12/27	1. Properties of cross correlation functions 2. Detection of time-limited signals 3. Cross spectral density functions 4. Applications 5. Tests for correlation between time series	Theory and application of cross correlation and coherence

17	01/03	1. Properties of cross correlation functions 2. Detection of time-limited signals 3. Cross spectral density functions 4.Applications 5. Tests for correlation between time series	Theory and application of cross correlation and coherence
18	01/10	期末考試週	
修課應注意事項			
教學設備	電腦、投影機		
教材課本	Introduction to Applied Statistical Signal Analysis: Guide to Biomedical and Electrical Engineering Applications, Richard Shiavi, Elsevier 2007		
參考書籍	Statistical and adaptive Signal Processing by Dimitris G. Manolakis, Vinay K. Ingle and Stephen M. Kogon		
批改作業篇數	篇 (本欄位僅適用於所授課程需批改作業之課程教師填寫)		
學期成績計算方式	◆平時考成績：        %    ◆期中考成績：        %    ◆期末考成績：50.0 % ◆作業成績： 50.0 % ◆其他〈 〉：        %		
備考	「教學計畫表管理系統」網址： <a href="http://info.ais.tku.edu.tw/csp">http://info.ais.tku.edu.tw/csp</a> 或由教務處首頁〈網址： <a href="http://www.acad.tku.edu.tw/index.asp/">http://www.acad.tku.edu.tw/index.asp/</a> 〉教務資訊「教學計畫表管理系統」進入。 <b>※非法影印是違法的行為。請使用正版教科書，勿非法影印他人著作，以免觸法。</b>		