(電機/通訊工程學系) (113 學年度)

課程名稱：(中文) 訊號與系統 (英文) Signals and Systems				開課單位	電機/通訊工程學系
				課程代碼	**4153201_01/4302010_01**
授課教師： 胡 家 彰					
學分數	3	必/選修	必修	開課年級	大二下
先修科目或先備能力： 微積分(一)(二)					
課程概述：This course is structured to develop in parallel the methods of analysis for continuous- and discrete-time signals and systems. This approach also offers a distinct and extremely important pedagogical advantage. Specifically, this course draws on the similarities between continuous- and discrete-time methods in order to share insights and intuition developed in each domain. Similarly, we can exploit the differences between them to sharpen an understanding of the distinct properties of each.					
課程目標：Signals and systems courses that bring discrete- and continuous-time concepts together in a unified way play an increasingly important role in the education of engineering students and in their preparation for current and future developments in their chosen fields.					
教科書	A. Oppenheim and A. Willsky, Signals and Systems. 2nd Ed., Prentice Hall, 2014 (高立圖書).				

課程大綱		分配時數				備註
單元主題	內容綱要	講授	示範	習作	其他[1]	
Signals and Systems	Continuous-Time and Discrete-Time Signals Transformations of the Independent Variable Exponential and Sinusoidal Signals The Unit Impulse and Unit Step Functions Continuous-Time and Discrete-Time Systems Basic System Properties	3				
Linear Time-Invariant Systems	Discrete-Time LTI Systems Continuous-Time LTI Systems Properties of Linear Time-Invariant Systems Causal LTI Systems Described by Differential and Difference Equations Singularity Functions	9				
Fourier Series Representation of Periodic Signals	The Response of LTI Systems to Complex Exponentials Fourier Series Representation of Continuous-Time Periodic Signals Convergence of the Fourier Series Properties of Continuous-Time Fourier Series Fourier Series Representation of Discrete-Time Periodic Signals	12				

	Properties of Discrete-Time Fourier Series Fourier Series and LTI Systems Filtering					
The Continuous-Time Fourier Transform	Representation of Aperiodic Signals The Fourier Transform for Periodic Signals Properties of the Continuous-Time Fourier Transform The Convolution Property The Multiplication Property Tables of Fourier Properties and Basic Fourier Transform Pairs Systems Characterized by Linear Constant-Coefficient Differential Equations	12				
The Discrete-Time Fourier Transform	Representation of Aperiodic Signals The Fourier Transform for Periodic Signals Properties of the Discrete-Time Fourier Transform The Convolution Property The Multiplication Property Tables of Fourier Properties and Basic Fourier Transform Pairs Duality Systems Characterized by Linear Constant-Coefficient Differential Equations	7.5				
Sampling	Representation of a Continuous-Time Signals by Its Samples Reconstruction of a Signal from its Samples Using Interpolation The Effect of Undersampling Discrete-Time Processing of Continuous-Time Signals Sampling of Discrete-Time Signals	7.5				
The Z-transform	The Z-Transform The Region of Convergence for the Z-Transform The Inverse Z-Transform Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot Properties of the Z-Transform	2				

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：□程式實作(0%)■期中考-I(30%) ■期中考-II(30%) ■期末考 (40%)

□作業(0%) ■出席率(10%)

教學資源：□課程網站　■教材電子檔供下載　□其他 _____

教學相關配合事項：學期末需到 ecourse 填寫 IEET 問卷作為一次點名成績。

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

1.1 瞭解電機工程相關知識

本課程注重於用數學工具描述電機工程所可能碰到的各式各樣問題，提供電機工程領域相關實作課程紮實的理論基礎。

1.2 培養電機工程相關領域實作技術

1.3 設計電機工程相關系統的能力

本課程是電機工程領域中，有關系統描述與分析最重要的理論課程，透過 Fourier Analysis 技巧，從 Frequency Domain 分析系統，更深入了解系統的特性，幫助工程人員設計更佳的系統。

1.4 訓練科技論文寫作與簡報的能力

課程中介紹與分析教科書中的英文單字與句型，提昇學生對科技論文的了解，並明瞭科技論文所要求的明確性與精準性，有助於同學往後更有效率與精準地吸收專業知識。

2.1 培養發掘、分析與解決問題之能力

2.2 應用現有的知識於不同的領域，進行創新研發

3.1 培養溝通與表達的能力

利用本課所介紹的 Fourier Analysis 分析工具，明確且嚴謹地表達與分析 Linear Time Invariant 訊號與系統。

3.2 訓練運用個人專長，與他人合作完成專案計畫

3.3 學習如何認清個人腳色配合團隊要求，達成團隊目標

4.1 瞭解國內外社會與產業現況

4.2 培養持續學習的習慣與能力

4.3 理解工程倫理及社會責任

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、教學相關配合事項等。