大學部課程綱要表

（114 學年度）

<table>
<tr><td colspan="4">課程名稱：（中文）數位訊號處理導論
（英文）Introduction to Digital Signal Processing</td><td>開課學系
課程代碼</td><td>電機工程學系
通訊工程學系
4153213_01（電機）
4303038_01（通訊）</td></tr>
<tr><td colspan="6">授課教師：余松年　Room 331, e-mail: ieesny@ccu.edu.tw, phone: ext. 33205</td></tr>
<tr><td>學分數</td><td>3</td><td>必/選修</td><td>選修</td><td>開課年級</td><td>大三</td></tr>
<tr><td colspan="6">先修科目或先備能力：</td></tr>
<tr><td colspan="6">課程概述與目標：Students will be familiar with the fundamental theories and techniques for digital signal processing.</td></tr>
<tr><td>教科書[1]</td><td colspan="5">“DSP First”, 2nd Edition, James H. McClellan, Ronald W. Schafer, Mark A. Yoder, Pearson Education Limited, 2017.（開發圖書：02-82423988）
教材網站：https://dspfirst.gatech.edu/</td></tr>
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<tr><td colspan="2">課程綱要</td><td rowspan="2">對應之學生核心能力</td><td rowspan="2">備註</td></tr>
<tr><td>單元主題</td><td>內容綱要</td></tr>
<tr><td>Introduction</td><td>1. Mathematical Representation of Signals.
2. Mathematical Representation of Systems.
3. Systems as Building Blocks.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
<tr><td>Sinusoids</td><td>1. Sinusoidal Signals.
2. Sampling and Plotting Sinusoids.
3. Complex Exponentials and Phasors.
4. Tuning Fork.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
<tr><td>Spectrum Representation</td><td>1. The Spectrum of a Sum of Sinusoids.
2. Fourier Series.
3. Time-Frequency Spectrum.
4. Frequency Modulation: Chirp Signals.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
<tr><td>Sampling and Aliasing</td><td>1. Sampling.
2. Spectrum View of Sampling and Reconstruction.
3. Discrete-to-Continuous Conversion.
4. The Sampling Theorem.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
<tr><td>FIR filters</td><td>1. Discrete-Time Systems.
2. The General FIR Filter.
3. Linear Time-Invariant (LTI) Systems.
4. Convolution and LTI Systems.
5. Cascaded LTI Systems.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
<tr><td>Frequency Response of FIR Filters</td><td>1. Sinusoidal Response of FIR Systems.
2. Superposition and the Frequency Response.
3. Graphical Representation of the Frequency Response.
4. Cascaded LTI Systems.</td><td>1.1, 2.1, 4.1, 4.4</td><td></td></tr>
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Discrete-Time Fourier Transform	1. DTFT: Fourier Transform for Discrete-Time Signals 2. Properties of the DTFT 3. Ideal Filters 4. Practical FIR Filters	1.1, 2.1, 4.1, 4.4	
Discrete Fourier Transform	1. Discrete Fourier Transform (DFT) 2. Properties of the DFT 3. Spectrum Analysis of Discrete Periodic Signals 4. Windows 5. The Spectrogram 6. The Fast Fourier Transform (FFT)	1.1, 2.1, 4.1, 4.4	
Z-Transform	1. Definition of the z-Transform. 2. Properties of the z-Transform. 3. Convolution and the z-Transform. 4. The Zeros and Poles of *H(z)* 5. Simple Filters. 6. Properties of Linear Phase Filters.	1.1, 2.1, 4.1, 4.4	
IIR Filters	1. The General IIR Difference Equation. 2. Frequency Response of an IIR Filter. 3. Steady-State Response and Stability. 4. Second-Order IIR Filters. 5. Frequency Response of Second-Order IIR Filter.	1.1, 2.1, 4.1, 4.4	

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：□期末報告（%）■期中考（47%）　■期末考（47%）　□作業（%）■上課點名（6%）

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：

核心能力

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

1.1 瞭解電機／通訊工程基礎知識
1.2 培養電機／通訊工程實作能力
1.3 訓練技術報告寫作與簡報的能力
2.1 培養分析問題的能力
2.2 培養善用資源以解決問題的能力
3.1 培養溝通與表達的能力
3.2 訓練運用個人專長，與他人合作完成專案計畫
4.1 瞭解國內外相關產業現況
4.2 理解工程倫理及社會責任
4.3 培養良好的資訊能力
4.4 培養科技英文能力

註：1. 教科書請註明書名、作者、出版社、出版年等資訊。
2. 教學要點概述請填寫教材編選、教學方法、評量方法、教學資源、教學相關配合事項等。
3. 學系所有開設之課程皆須填寫此表格或提供原有格式之課程綱要表。若能蒐集校際所開設課程，如共同必修科目、通識課程等之課程綱要表，亦可提供。