通訊所專業必修/必選修課程綱要表

課程名稱：（中文）通訊之隨機程序				開課學程	通訊所
（英文）Random Processes for Communications				課程代碼	COM5110
授課教師：洪樂文					
學分數	3	必/選修	選修	開課年級	碩士班、博士班
先修科目或先備能力：機率、微積分					
課程概述與目標：This course covers the basics of random processes with emphasis on applications to signal processing and communications. This is a basic yet important course for students pursuing studies in these fields. The course includes basic concepts on random processes, stationarity, convergence of random sequences, law of large numbers, and examples of important random processes such as Markov processes, Poisson processes, and Gaussian processes etc. With applications to communications and signal processing, we will also cover topics related to linear systems, spectral analysis, estimation, Karhunen-Loeve expansion *etc*					
教科書[1]	Athanasios Papoulis and S. Unnikrishna Pillai, "*Probability, Random Variables, and Stochastic Processes*," McGraw Hill, 2002				
參考書目	1. Henry Stark and John W. Woods, *Probability and Random Processes with Applications to Signal Processing*, Prentice-Hall, 2002 2. Samuel Karlin and Howard M. Taylor, *A First Course in Stochastic Processes*, Academic Press, 1975. 3. Lonnie C. Ludeman, *Random Processes: Filtering, Estimation and Detection*, John Wiley, 2002.				

對應之學生核心能力	核心能力達成指標	比例
1.發掘、分析、解決問題與獨立研究之能力	A.具備發掘問題之能力 B.具備分析問題之能力 C.具備解決問題之能力 D.具備獨立研究之能力	50%
2.通訊科技整合與創新之能力	A.具備整合通訊知識之能力 B.具備創新通訊科技知識之能力	20%
3.學習新知識與技術之能力	A.具備主動學習新知識之能力 B.具備學習新技術之能力	20%
4.良好溝通、表達與外語能力	A.具備與通訊專業人員溝通與表達專業知識之能力 B.具備外語專業能力用以溝通通訊專業知識	10%
5.具團隊精神及遵守專業倫理	A.具備團隊合作之能力與精神 B.能遵守專業倫理	0%

課程綱要	內容綱要	核心能力達成指標（請勾選）

1. Random Variables and Random Vectors	1. Review of Probability Theory and Random Variables 2. Review of Random Vectors	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
2. Random Sequences and Discrete-Time Random Processes	1. Basic Definition 2. Examples 3. Convergence 4. Law of Large Numbers	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
3. Continuous-Time Random Processes	1. Basic Definition 2. Examples 3. Stationarity 4. Linear Systems 5. Power Spectrum	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
4. Random Processes in Communications	1. Noise Processes 2. Modulation 3. Band-Limited Processes 4. Matched-Filtering	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
5. Spectral Representation and Estimation	1. Innovation 2. Karhunen-Loeve Expansion 3. Ergodicity 4. Mean Square Estimation	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
6. Markov Chains and Markov Processes	1. Steady-State Distribution 2. Chapman-Kolmogorov Equations 3. State Classification 4. Absorption, Recurrence, Transience 5. Queuing	1-■A■B■C□D 2-□A■B 3-□A■B 4-□A■B 5-□A□B
教學要點概述[2]： 1. 教材編選：以教科書內容為主 2. 教學方法：課堂講解、英語授課 3. 評量方法：Homework 30%; Midterm 35%; Final Exam 35% 4. 教學資源：無		

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. 研究所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，並呈現於實地訪評現場。