研究所課程綱要表 Graduate degree - Course Syllabus

課程名稱 Course Name：（中文 CH）圖形識別 Course Title:（英文 EN）Pattern Recognition				開課系所 Department	Electrical Engineering/Master Program in Advanced Engineering
				課程代碼 Course code	4465054
授課教師 Professor：Wen-Nung Lie (賴文能)					
學分數 Credits	3	必/選修 Req/Elec	elective	開課年級 Grade	Graduate level
先修科目或先備能力 Prerequisite：none					
課程概述：Course Overview: Course description：This course is to learn traditional pattern recognition techniques such as statistical, neural network, and deep learning approaches. We also want to train the students with practice applications via specific-topic project or homework. **This is a full English-taught course.**					
學習目標：Learning Objective: Learning how to design classifiers based on statistical techniques					
教科書 Textbooks[1]	Pattern Classification, R.O. Duda, P.E. Hart and D.G. Stork, Wiley-Interscience Publication, 2001，2nd Edition				

課程綱要 Syllabus		對應之學生核心能力 Student Competencies	備註 Comments
單元主題 Topic	內容綱要 Content Summary		
Introduction	1. Goals of PR 2. Applications of PR	1.1,1.2,2.1,4.1	
Bayesian Decision Theory	1. The probability structure underlying the categories is known	1.1,1.2,2.1,4.1	
Maximum-Likelihood and Bayesian Parameter Estimation	1. The full probability structure underlying the categories is not known 2. The general forms of their distributions are known	1.1,1.2,2.1,4.1	
Nonparametric Techniques	1. There is no prior parameterized knowledge about the underlying probability structure 2. Classification is based on the training samples alone 3. Nearest-neighbor algorithm	1.1,1.2,2.1,4.1	
Linear Discriminant Functions	1. Parameter estimation 2. Derive a class of incremental training rules	1.1,1.2,2.1,4.1	
Multilayer Neural Networks	1. Linear discriminants can be extended for training multilayer neural networks	1.1,1.2,2.1,4.1	
Unsupervised Learning and Clustering	1. Input training patterns are not labeled 2. Determine the cluster structure	1.1,1.2,2.1,4.1	
Deep Learning Networks	1. Introduction of DL 2. Variants of neural networks (CNN, RNN, LSTM) 3. Unsupervised learning and reinforcement learning 4. Generative adversarial network (GAN)	1.1,1.2,2.1,4.1	

教學要點概述[2]：Grading Standards：

教材編選 Textbook：■自編教材 Own teaching material　□教科書作者提供 Authored Textbooks

教學方法 Teaching Method：

■投影片講述 PPT　■板書講述 Blackboard　□實例示範 Demonstration by examples
□操作練習 Activities

評量方法 Grading Method：□上課點名 Final Presentation（%）　□小考 Quiz（%）
□作業 Homework（%）　■程式實作 Program implementation（50%）
□實習報告 Internship report（%）　□專案 project（%）　□期中考 Mid-term exam（0%）
■期末考 Final exam（50%）　□期末報告 Final report（0%）　□其它 Other（%）

教學資源 Teaching Resources：□課程網站 Course Website
■教材電子檔供下載 Teaching Material Downloads　□其他 Other _____

教學相關配合事項 Other matters related：

核心能力 Core Capabilities

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

1.1 學習電機／通訊工程相關領域之理論基礎(Learning the theoretical basis of EE/COMM related fields)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

1.2 瞭解電機／通訊工程相關領域之實務技術(Studying the substantive technologies of EE/COMM related fields)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

1.3 訓練專業論文寫作與簡報的能力(Practice writing thesis and professional papers)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

2.1 培養發掘與分析電機／通訊工程特定領域專題研究之能力(Cultivating the ability to explore and analyze case studies of specific areas in EE/COMM)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

2.2 培養規劃與執行電機／通訊工程特定領域專題研究之能力(Cultivating the capacity of planning and implementation of Case studies of specific areas in EE/COMM)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

3.1 學習溝通與表達的能力 (Practice communication and self-expression)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

3.2 運用個人專長，與團隊成員合作達成計畫目標 (Collaboration with others)

為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

4.1 瞭解國內外電機／通訊工程特定領域產業現況與需求 (Understand local and international EE/COMM industry and demands)
為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

4.2 理解工程倫理及社會責任(Understanding engineering ethics and social responsibility)
為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

4.3 培養良好的國際觀 (Develop international outlook)
為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

4.4 培養特定領域專業科技英文能力 (Develop the professional field English ability)
為何有關(Why is the course capable of cultivating this ability?)：
達成指標(Indicators to be reached)：
評量方法(Assessment methods)：

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。
Include teaching materials, teaching method, assessment method, teaching resources, related matters
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。