

課程名稱 (英)	Data Science and Decision Technology		
授課教師資訊	姓名:張良志 所屬單位: 工 學院 化工 系所 E-mail: optnaut@gmail.com 電話: 0908257299		
開課時間	109學年 <input type="checkbox"/> 一學年 <input checked="" type="checkbox"/> 第二學期	必/選修	<input type="checkbox"/> 必修 <input checked="" type="checkbox"/> 選修
課程識別碼	524 U2290	班次	
預計修課人數	40	學分數	3
課程屬性	<input checked="" type="checkbox"/> 新開課程 (未曾開授之英語授課課程) <input type="checkbox"/> 續開課程		
檢附資料	<input type="checkbox"/> 續開課程請檢附上次開課期末教學意見調查結果		
Course Syllabus in English			
Course Description	This course consists of two parts. The first part gives a broad coverage of modern modeling, Data Science, Machine Learning (ML) methods used for prediction and classification. It also includes Deep Learning Neural Networks for image, language, and time-series data processing. The second part provides a solid foundation of optimal decision making that can be applied to multiple business and engineering disciplines such as planning, profit maximization, business strategy setting, and logistics. Business and engineering applications will be discussed throughout the course.		
Course Requirements	College-level math, Excel, Matlab Learners (prior Matlab experience is not necessary)		
Course Objectives	Provides students with the theoretical foundation and hands-on practice of data science and optimal decision making.		
Learning Outcomes	After the course students should have a good understanding of major machine learning algorithms and the common modeling issues. They should also understand how to formulate a business issue as an optimization problem and how to reach the optimal decision. The skills can be applied to their engineering, business, or data scientist careers.		
Required Readings	1. "Hands-on Machine Learning with Scikit-Learn & TensorFlow", 2 nd . A. Geron, O'Reilly, 2019. 2. "Management Science", 4th ed, S.G. Powell and K.R. Baker, Wiley, 2014. Optional (Nice to Have)		
Grading	Midterm, Final, Homework (2)		
Course Schedule in English			
Week	Date	Topic	Lecturer
Week 1	2/23	Course introduction and policy. State of art of Machine Learning. Machine learning landscape and examples.	張良志
Week 2	3/2	Introduction to optimization (Part I). Linear Regression and common modeling issues.	以下同上
Week 3	3/9	Common modeling issues e.g. feature engineering, data preprocessing, overfit and underfit issues	
Week 4	3/16	Classification methods-I and business applications (Logistic Regression), Principal Component Analysis (PCA) and its applications	
Week 5	3/23	Classification methods (KNN, Logistic Regression, Decision Tree, Support Vector Machine)	
Week 6	3/30	Classification Performance measures and Clustering, Unsupervised learning	
Week 7	4/6	Neural Network structures and calculation. Neural Net training	

Week 8	4/13	Deep Learning Neural Net I (Convolutional N	
Week 9	4/20	Deep Learning Neural Net II (Recurrent NN f sequence data)	
Week 10	4/27	Mid-term Exam	
Week 11	5/4	Applications of Machine Learning in Chem E Mathematical foundation of constrained optim	
Week 12	5/11	Linear Programming I: Translating business into LP formulation.	
Week 13	5/18	Linear Programming II Network Model, Appli in Model Predictive Control.	
Week 14	5/25	Non-Linear Programming in Engineering app	
Week 15	6/1	Real-time Optimization in refinery and chemi processes. Integer Programming	
Week 16	6/8	Integer Programming and Mixed Integer Programming	
Week 17	6/15	Uncertainty and Monte-Carlo Simulation. Re and Final Exam	
Week 18	6/22	Final Exam	