國立交通大學資訊工程學系	課程名稱： Deep Learning and Practice (深度學習與實作)		
授課/指導教師	彭文孝(Peng)、吳毅成(Wu)、陳永昇(Chen)	連絡方式	wpeng@cs.nctu.edu.tw ; icwu@cs.nctu.edu.tw yschen@cs.nctu.edu.tw
助教	鍾嘉峻、桂浤、張家仁、王暉博		zhongturtle@gmail.com moporgic.t32gipa9.id@gmail.com followwar@gmail.com a88575847@gmail.com
先修課程	Linear Algebra, Probability Theory, Machine Learning (suggested)	授課對象	大四及研究生

分組方式	師資人力	其他規劃
2 人/組(Paper and Final) 1 人/組(Lab)	指導教師 3 人 助教 4 人	(1) To submit final projects as academic papers (2) To hold exhibition to showcase final projects (3) To encourage students to participate in various challenges in the fields of computer vision, gaming, data analytics, etc.

課程目標 (objectives)	(1) To understand the maths of deep learning techniques (2) To familiarize with deep learning tools, such as PyTorch, Tensor Flow, etc. (3) To understand the latest developments and applications of deep learning techniques (4) To develop practical working systems
評分方式	Labs (done individually) 40%, Paper presentention (done in groups of 2 members) 20% Final project (done in groups of 2 members) 20% Final exam 20%

預定使用教材	用途	教材名稱	教材來源(請註明所佔比重) 自行編寫	現有出版品
	上課	1. I. Goodfellow, Y. Bengio, and A. Courville, *Deep Learning*, 1st Ed., MIT Press, Dec. 2016 2. R. S. Sutton and A. G. Barto, Reinforcement Learning: An Introduction, Nov. 2017	50%	50%

課程內容及上課方式

課程內容大綱	Weeks	搭配實驗/實習項目	所需時間
A. Introduction	1 Feb. 22 (All)	N/A	3 hrs
B. Machine Learning Basics ■ Linear Algebra ■ Probability and Information Theory ■ Numerical Computation ■ Machine Learning Basics	2 Mar. 1 (Peng)	~~Warm-up (Python + PyTorch)~~	6 hrs
C. Deep Networks ■ Deep Feedforward Networks ■ Convolutional Networks	3 Mar. 8 (Chen)	Warm-up (Python + PyTorch)	6 hrs
■ Convolutional Networks	4 Mar. 15 (Chen)	Warm-up (Back-propagation)	6 hrs

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■ Optimization for Training Deep Models ■ Recurrent and Recursive Nets	5 Mar. 22 (Peng)	Convolutional Nets	6 hrs
■ Regularization for Deep Learning	6 Mar. 29 (Peng)	Convolutional Nets	6 hrs
Spring break (no lecture)	7 Apr. 5	Convolutional Nets + Recurrent Nets	6 hrs
D. Deep Learning Research ■ Linear Factor Models ■ Autoencoders	8 Apr. 12 (Peng)	Convolutional Nets + Recurrent Nets	6 hrs
■ Autoencoders ■ Generative Adversarial Networks	9 Apr. 19 (Peng)	Paper study proposal presentation (Tue. 4hrs)	6 hrs
■ Generative Adversarial Networks ■ Structured Probabilistic Models for Deep Learning	10 Apr. 26 (Peng)	Variational autoencoders + Generative adversarial networks	6 hrs
■ Approximate Inference ■ Restricted Boltzmann Machines	11 May 3 (Peng)	Variational autoencoders + Generative adversarial networks	6 hrs
E. Deep Reinforcement Learning ■ Introduction	12 May 10 (Wu)	Final project proposal presentation (Tue. 4hrs)	6 hrs
■ MDP/POMDP + TD Learning	13 May 17 (Wu)	Deep Reinforcement Learning (2048 Games)	6 hrs
■ Monte-Carlo Learning +Policy Gradient	14 May 24 (Wu)	Deep Reinforcement Learning (Atari Games)	6 hrs
■ Various DRL Methods.	15 May 31 (Wu)	Deep Reinforcement Learning (Actor-Critic)	6 hrs
F. Paper Study and Presentation	16	Presentation (Tue. + Thu.)	6 hrs
G. Paper Study and Presentation	17	Presentation (Tue. + Thu.)	6 hrs
H. Final Exam	18		6 hrs
I. Final Project Presentation	TBD	Workshop	