Tamkang University Academic Year 105, 2nd Semester Course Syllabus

Course Title	DEEP LEARNING	Instructor	CHUN-HAO CHEN
Course Class	TEIXM1A MASTER'S PROGRAM, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION ENGINEERING, 1A	Details	◆ Selective ◆ One Semester ◆ 3 Credits

Departmental Aim of Education

Ⅰ. Cultivate the ability to conduct independent research and problem solving.

Ⅱ. Strengthen creativity and research capacity.

Ⅲ. Build profound professional knowledge in computer science and information engineering.

Ⅳ. Engage in self-directed lifelong learning.

Departmental core competences

A. Independent problem solving ability.

B. Independent innovative thinking ability.

C. Research paper writing and presentation ability.

D. Research&development (R&D) ability in information engineering.

E. Project execution and control ability.

F. Lifelong self-directed learning ability.

Course Introduction	In this course, concepts, properties, progresses and advantages of deep learning are introduced in following three directions: (1)Applied Math and Machine Learning Basics; (2)Deep Networks: Modern Practices; (3)Deep Learning Research. In first part, basic knowledge, e.g., linear algebra, information theory, is reviewed. In second part, some models, e.g., deep feed forward networks, sequence modeling, are stated. At last, research topics are described.

The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :

(i) Cognitive Domain : C1-Remembering, C2-Understanding, C3-Applying, C4-Analyzing, C5-Evaluating, C6-Creating

(ii) Psychomotor Domain : P1-Imitation, P2-Mechanism, P3-Independent Operation, P4-Linked Operation, P5-Automation, P6-Origination

(iii) Affective Domain : A1-Receiving, A2-Responding, A3-Valuing, A4-Organizing, A5-Charaterizing, A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :

(i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.

(ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)

(iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	Deep Learning Overview	C2	ABCD
2	Deep Learning: Basic Knowledge Review	C2	ABCD
3	Deep Learning: Models	C2	ABCD
4	Deep Learning: Researches	C6	ABCD
5	Paper Study	C6	ABCD

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	Deep Learning Overview	Lecture, Discussion, Simulation	Report, Participation
2	Deep Learning: Basic Knowledge Review	Lecture, Discussion, Simulation	Practicum, Report, Participation
3	Deep Learning: Models	Lecture, Discussion, Simulation	Practicum, Report, Participation
4	Deep Learning: Researches	Discussion, Appreciation	Practicum, Report
5	Paper Study	Lecture, Discussion	Practicum, Report

This course has been designed to cultivate the following essential qualities in TKU students

Essential Qualities of TKU Students	Description
◇ A global perspective	Helping students develop a broader perspective from which to understand international affairs and global development.
◆ Information literacy	Becoming adept at using information technology and learning the proper way to process information.
◇ A vision for the future	Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.
◇ Moral integrity	Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.
◆ Independent thinking	Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.
◇ A cheerful attitude and healthy lifestyle	Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.
◆ A spirit of teamwork and dedication	Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.
◇ A sense of aesthetic appreciation	Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.

Course Schedule

Week	Date	Subject/Topics	Note
1	106/02/13 ~ 106/02/19	Deep Learning Overview	
2	106/02/20 ~ 106/02/26	Applied Math and Machine Learning Basics - I	
3	106/02/27 ~ 106/03/05	Applied Math and Machine Learning Basics - II	
4	106/03/06 ~ 106/03/12	Applied Math and Machine Learning Basics - III	
5	106/03/13 ~ 106/03/19	Applied Math and Machine Learning Basics - IV	
6	106/03/20 ~ 106/03/26	Deep Networks: Modern Practices - I	
7	106/03/27 ~ 106/04/02	Deep Networks: Modern Practices - II	Please go to room number E718
8	106/04/03 ~ 106/04/09	Deep Networks: Modern Practices - III	
9	106/04/10 ~ 106/04/16	Deep Networks: Modern Practices - IV	
10	106/04/17 ~ 106/04/23	Deep Networks: Modern Practices - V	
11	106/04/24 ~ 106/04/30	Deep Learning Research - I	
12	106/05/01 ~ 106/05/07	Deep Learning Research - II	

13	106/05/08 ~ 106/05/14	Deep Learning Research - III	
14	106/05/15 ~ 106/05/21	Deep Learning Research - IV	
15	106/05/22 ~ 106/05/28	Deep Learning Research - V	
16	106/05/29 ~ 106/06/04	Discussion&Paper Study	
17	106/06/05 ~ 106/06/11	Discussion&Paper Study	
18	106/06/12 ~ 106/06/18	Discussion&Paper Study	

Requirement	
Teaching Facility	Computer, Projector
Textbook(s)	Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016
Reference(s)	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 30.0 % ◆ Mark of Usual：30.0 % ◆ Midterm Exam： % ◆ Final Exam： % ◆ Other〈Paper Study〉：40.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . **※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**