

Tamkang University Academic Year 111, 2nd Semester Course Syllabus

Course Title	MACHINE LEARNING SPECIALIZATION	Instructor	HO THI TRANG
Course Class	TEIBM1A MASTER'S PROGRAM, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION ENGINEERING (ENGLISH-TAUGHT PROGRAM),	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	1A SDG9 Industry, Innovation, and Infrastructure		
Departmental Aim of Education			
<ul style="list-style-type: none"> 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. 			
Subject Departmental core competences			
<ul style="list-style-type: none"> A. Independent problem solving ability.(ratio:20.00) B. Independent innovative thinking ability.(ratio:20.00) C. Research paper writing and presentation ability.(ratio:20.00) D. Research & development (R&D) ability in information engineering.(ratio:20.00) E. Project execution and control ability.(ratio:10.00) F. Lifelong self-directed learning ability.(ratio:10.00) 			
Subject Schoolwide essential virtues			
<ul style="list-style-type: none"> 1. A global perspective. (ratio:10.00) 2. Information literacy. (ratio:20.00) 3. A vision for the future. (ratio:20.00) 4. Moral integrity. (ratio:10.00) 5. Independent thinking. (ratio:10.00) 6. A cheerful attitude and healthy lifestyle. (ratio:10.00) 7. A spirit of teamwork and dedication. (ratio:10.00) 8. A sense of aesthetic appreciation. (ratio:10.00) 			

Course Introduction	<p>This course will teach you the fundamentals of machine learning and how to use these techniques to build real-world AI applications. It provides a broad introduction to modern machine learning, including supervised learning, unsupervised learning, and some of the best practices used in Silicon Valley for artificial intelligence and machine learning innovation. This course does not require any prior Machine Learning experience. However, some knowledge of the Python programming language and high school math is necessary.</p>
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The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

- I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.
- II. Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.
- III. Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	Build machine learning models in Python using popular machine learning libraries NumPy and scikit-learn.	Cognitive
2	Build and train supervised machine learning models for prediction and binary classification tasks, including linear regression and logistic regression.	Cognitive
3	Build and train a neural network with TensorFlow to perform multi-class classification.	Cognitive
4	Apply best practices for machine learning development so that your models generalize to data and tasks in the real world.	Cognitive
5	Recommender systems with a collaborative filtering approach and a content-based deep learning method	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABD	27	Lecture, Discussion, Experience	Discussion(including classroom and online), Practicum
2	ADEF	2357	Lecture, Discussion, Experience	Discussion(including classroom and online), Practicum

3	C	145	Lecture, Discussion, Experience	Discussion(including classroom and online), Practicum
4	CDF	125678	Lecture, Discussion, Experience	Discussion(including classroom and online), Practicum
5	ABDF	1258	Lecture, Discussion, Experience	Discussion(including classroom and online), Practicum

Course Schedule

Week	Date	Course Contents	Note
1	112/02/13 ~ 112/02/19	Course introduction, introduction to machine learning	
2	112/02/20 ~ 112/02/26	Supervised learning, unsupervised learning, jupyter notebooks	In-class assignment
3	112/02/27 ~ 112/03/05	Linear regression with one variable	
4	112/03/06 ~ 112/03/12	Linear algebra review	In-class assignment
5	112/03/13 ~ 112/03/19	Linear regression with multiple variables	
6	112/03/20 ~ 112/03/26	Classification: logistic regression	
7	112/03/27 ~ 112/04/02	Classification: regularization	
8	112/04/03 ~ 112/04/09	Advanced learning algorithms: neural network	
9	112/04/10 ~ 112/04/16	Advanced learning algorithms: neural network training	
10	112/04/17 ~ 112/04/23	Midterm exam week	Final project proposal
11	112/04/24 ~ 112/04/30	Advice for applying machine learning(1)	In-class assignment
12	112/05/01 ~ 112/05/07	Advice for applying machine learning (2)	
13	112/05/08 ~ 112/05/14	Decision trees, support vector machines	
14	112/05/15 ~ 112/05/21	Clustering, dimensionality reduction	
15	112/05/22 ~ 112/05/28	Recommender systems	
16	112/05/29 ~ 112/06/04	Case study	
17	112/06/05 ~ 112/06/11	Final report presentation	
18	112/06/12 ~ 112/06/18	Final exam week	

Requirement	
Teaching Facility	Computer, Projector
Textbooks and Teaching Materials	We will mainly use online resources as the teaching materials. Pattern Recognition and Machine Learning, Christopher Bishop. http://cs229.stanford.edu/
References	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	<p>◆ Attendance : 10.0 % ◆ Mark of Usual : % ◆ Midterm Exam : 30.0 %</p> <p>◆ Final Exam : 45.0 %</p> <p>◆ Other <Assignment> : 15.0 %</p>
Note	<p>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 .</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p>