Tamkang University Academic Year 105, 1st Semester Course Syllabus

Course Title	MACHINE LEARNING	Instructor	YA-MEI, CHANG
Course Class	TLSXM1A MASTER'S PROGRAM, DEPARTMENT OF STATISTICS, 1A	Details	◆ Selective ◆ One Semester ◆ 3 Credits

Departmental Aim of Education

Ⅰ. Cultivate students with ability to conduct research on statistical theory.

Ⅱ. Cultivate students with ability for statistical programming.

Ⅲ. Cultivate students to become statistical professionals with management capabilities.

Ⅳ. Cultivate students with international perspectives.

Departmental core competences

A. Ability to conduct research of statistical theory.

B. Data analysis skills.

C. Ability to acquire interdisciplinary knowledge.

D. Logical thinking ability.

E. Statistical consulting ability.

Course Introduction	Introduce machine learning concepts, methods and tools. The contents include linear regression, classification, resampling methods, models selection, regularization, GAM models, tree-based methods and support vector machine.

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	Machine learning concepts	C2	A
2	Machine learning methods	C4	B
3	Machine learning tools	C3	B

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	Machine learning concepts	Lecture, Discussion	Written test, Practicum, Report, Participation
2	Machine learning methods	Lecture, Discussion	Written test, Practicum, Report, Participation
3	Machine learning tools	Lecture, Discussion	Written test, Practicum, Report, Participation

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	105/09/12 ~ 105/09/18	Introduction	
2	105/09/19 ~ 105/09/25	Linear Regression	
3	105/09/26 ~ 105/10/02	Classification	
4	105/10/03 ~ 105/10/09	Classification	
5	105/10/10 ~ 105/10/16	Resampling Methods	
6	105/10/17 ~ 105/10/23	Linear Models Selection and Regularization	
7	105/10/24 ~ 105/10/30	Linear Models Selection and Regularization	
8	105/10/31 ~ 105/11/06	Moving beyond Linearity	
9	105/11/07 ~ 105/11/13	Moving beyond Linearity	
10	105/11/14 ~ 105/11/20	Midterm Exam Week	
11	105/11/21 ~ 105/11/27	Moving beyond Linearity	
12	105/11/28 ~ 105/12/04	Tree-Based Methods	

13	105/12/05 ~ 105/12/11	Tree-Based Methods	
14	105/12/12 ~ 105/12/18	Tree-Based Methods	
15	105/12/19 ~ 105/12/25	Support Vector Mechines	
16	105/12/26 ~ 106/01/01	Support Vector Mechines	
17	106/01/02 ~ 106/01/08	Support Vector Mechines	
18	106/01/09 ~ 106/01/15	Final Exam Week	

Requirement	none
Teaching Facility	Computer, Projector
Textbook(s)	An Introduction to Statistical Learning: with Applications in R
Reference(s)	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 5.0 % ◆ Mark of Usual：30.0 % ◆ Midterm Exam： 30.0 % ◆ Final Exam： 30.0 % ◆ Other〈participation〉：5.0 %
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.**