Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	MACHINE LEARNING	Instructor	TSENG, YAO-TING
Course Class	ULSAM1A MASTER'S PROGRAM IN APPLIED STATISTICS, DEPARTMENT OF STATISTICS AND DATA SCIENCE, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education		

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.

Subject Departmental core competences

A. Ability to conduct research of statistical theory.(ratio:20.00)

B. Data analysis skills.(ratio:20.00)

C. Ability to acquire interdisciplinary knowledge.(ratio:20.00)

D. Logical thinking ability.(ratio:20.00)

E. Statistical consulting ability.(ratio:20.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:15.00)
2. Information literacy. (ratio:20.00)
3. A vision for the future. (ratio:15.00)
4. Moral integrity. (ratio:5.00)
5. Independent thinking. (ratio:20.00)
6. A cheerful attitude and healthy lifestyle. (ratio:5.00)
7. A spirit of teamwork and dedication. (ratio:10.00)
8. A sense of aesthetic appreciation. (ratio:10.00)

Course Introduction	This course will introduce the fundamentals of machine learning and provide hands-on experience. Students will learn how to implement machine learning models using software such as R and Python. The course covers topics including the basic concepts and terminology of machine learning, as well as supervised learning models such as logistic regression, decision trees, neural network, and support vector machines. Students will also learn techniques for model evaluation and optimization, such as data splitting skill and cross-validation test.

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	Understand machine learning model and understand flow with analytic cycle.	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDE	12345678	Lecture, Discussion	Testing, Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Introduction	
2	114/09/22 ~ 114/09/28	Statistical Learning	
3	114/09/29 ~ 114/10/05	Linear Regression	
4	114/10/06 ~ 114/10/12	Classification	
5	114/10/13 ~ 114/10/19	Classification	
6	114/10/20 ~ 114/10/26	Resampling Method	

7	114/10/27 ~ 114/11/02	Learning Model Selection and Regularization	
8	114/11/03 ~ 114/11/09	Learning Model Selection and Regularization	
9	114/11/10 ~ 114/11/16	Midterm Exam	
10	114/11/17 ~ 114/11/23	Moving Beyond Linearity	
11	114/11/24 ~ 114/11/30	Moving Beyond Linearity	
12	114/12/01 ~ 114/12/07	Tree-Based Methods	
13	114/12/08 ~ 114/12/14	Tree-Based Methods	
14	114/12/15 ~ 114/12/21	Support Vector Machines	
15	114/12/22 ~ 114/12/28	Unsupervised Learning	
16	114/12/29 ~ 115/01/04	Final Exam	
17	115/01/05 ~ 115/01/11	Flex week, learning activities - Survival Analysis and Censored Data	
18	115/01/12 ~ 115/01/18	Flex week, learning activities - Multiple Testing	

Key capabilities	
Interdisciplinary	
Distinctive teaching	
Course Content	Computer programming or Computer language (students have hands-on experience in related projects) Logical Thinking AI application
Requirement	1. If you skip class, 3 points will be deducted from your total score each time. 2. The usual mark including the homework.
Textbooks and Teaching Materials	Using teaching materials from other writers:Textbooks Name of teaching materials: An Introduction to Statistical Learning with Applications in R (Author: Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani)

References	The Elements of Statistical Learning Data Mining, Inference, and Prediction (Author: Trevor Hastie, Robert Tibshirani, and Jerome Friedman) An Introduction to Statistical Learning with Applications in Python (Author: Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, and Jonathan Talyor)
Grading Policy	◆ Attendance： % ◆ Mark of Usual：30.0 % ◆ Midterm Exam： 35.0 % ◆ Final Exam： 35.0 % ◆ Other〈 〉： %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at https://web2.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. ※"Adhere to the concept of intellectual property rights" and "Do not illegally photocopy, download, or distribute." Using original textbooks is advised. It is a crime to improperly photocopy others' publications.