Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	ADVANCED BIOSTATISTICS	Instructor	LIANG, YUAN-LIN
Course Class	TZIBM1A MASTER'S PROGRAM, DIVISION OF GERONTECHNOLOGY, GRADUATE INSTITUTE OF INTELLIGENT HEALTHCARE INDUSTRY, 1A	Details	◆ General Course ◆ Required ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG3 Good health and well-being for people SDG4 Quality education SDG9 Industry, Innovation, and Infrastructure		

Departmental Aim of Education

Ⅰ. Development of problem solving capacity.

Ⅱ. Development of reserch and innovation capacity.

Ⅲ. Enhancement of cross-disciplinary capactiy.

Ⅳ. Development of lifelong self learning capacity.

Subject Departmental core competences

A. Capacity of problem solving.(ratio:10.00)

B. Capacity of senior health managemnt.(ratio:10.00)

C. Capacity of Healthcare Industry Management.(ratio:15.00)

D. Analytical capacity of health informatics.(ratio:10.00)

E. Capacity of research and innovation.(ratio:15.00)

F. Capacity of Scientific Paper Writing.(ratio:15.00)

G. Capacity of lifelong self learning.(ratio:15.00)

H. Creative Capacity.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:10.00)

3. A vision for the future. (ratio:15.00)

4. Moral integrity. (ratio:10.00)

5. Independent thinking. (ratio:15.00)

6. A cheerful attitude and healthy lifestyle. (ratio:15.00)

7. A spirit of teamwork and dedication. (ratio:15.00)

8. A sense of aesthetic appreciation. (ratio:10.00)

Course Introduction	This course introduces the applications of machine learning techniques in biostatistics. This course is designed for students and professionals who wish to expand their knowledge to include advanced topics that are increasingly relevant in the age of big data and personalized medicine.

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 the machine learning techniques in biostatistics	Cognitive
2	Apply machine learning in biostatistics	Psychomotor
3	Interpret Results and Make Informed Decisions	Affective

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDEFGH	12345678	Lecture, Discussion	Discussion(including classroom and online), Report(including oral and written)
2	ABCDEFGH	12345678	Lecture, Discussion, Practicum, Experience	Study Assignments, Practicum
3	ABCDEFGH	12345678	Lecture, Discussion	Discussion(including classroom and online), Practicum, Report(including oral and written)

Course Schedule			
Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Introduction to Advanced Biostatistics and Machine Learning	
2	114/09/22 ~ 114/09/28	Data Preprocessing and Exploration	
3	114/09/29 ~ 114/10/05	Supervised Learning Fundamentals	
4	114/10/06 ~ 114/10/12	Decision Trees and Random Forests	
5	114/10/13 ~ 114/10/19	Support Vector Machines (SVM)	
6	114/10/20 ~ 114/10/26	Unsupervised Learning: Clustering	
7	114/10/27 ~ 114/11/02	Time Series Analysis in Biostatistics	
8	114/11/03 ~ 114/11/09	Survival Analysis with Machine Learning	
9	114/11/10 ~ 114/11/16	Mid-Term Presentation	
10	114/11/17 ~ 114/11/23	Neural Networks Basics	
11	114/11/24 ~ 114/11/30	Deep Learning and Convolutional Neural Networks (CNNs)	
12	114/12/01 ~ 114/12/07	Long-Short Term Memory Neural Networks (LSTM)	
13	114/12/08 ~ 114/12/14	Ensemble Methods	
14	114/12/15 ~ 114/12/21	Advanced Topics in Machine Learning	
15	114/12/22 ~ 114/12/28	Model Evaluation and Validation	
16	114/12/29 ~ 115/01/04	Integrating ML into Biostatistical Research	
17	115/01/05 ~ 115/01/11	Final Presentation	
18	115/01/12 ~ 115/01/18	Review	

Key capabilities	Information Technology Humanistic Caring Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)

Distinctive teaching	Project implementation course
Course Content	Logical Thinking AI application
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks, Presentations
References	
Grading Policy	◆ Attendance： 20.0 % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： 30.0 % ◆ Final Exam： 30.0 % ◆ 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.