Tamkang University Academic Year 113, 1st Semester Course Syllabus

Course Title	FUNDAMENTAL OF MACHINE LEARNING AND DEEP LEARNING	Instructor	ISAAC YIHJIA TSAI
Course Class	TEXBM1A INTERNATIONAL INTENSE MASTER'S PROGRAM IN AI INTELLIGENT MACHINERY AND SUSTAINABLE MANUFACTURING, COLLEGE OF	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	ENGINEERING (ENGLISH-TAUGHT PRO, 1A SDG4 Quality education		

Departmental Aim of Education

Ⅰ. Educating students to possess the ability to apply AI in the field of intelligent machinery and manufacturing, while also fostering the capability to implement sustainable development goals.

Ⅱ. Training students to possess independent research and problem-solving skills, and to adhere to engineering ethics as professional engineers.

Ⅲ. Cultivating students' ability to discern international technology trends and engage in global communication and cooperation.

Ⅳ. Developing students' abilities for lifelong learning and staying current with the times.

Subject Departmental core competences

A. AI Technology Application and Innovation Capabilities.(ratio:20.00)

B. Intelligent Machinery and Manufacturing R&D Capabilities.(ratio:20.00)

C. Independent Research and Problem-Solving Skills.(ratio:20.00)

D. Sustainable Development Goals Implementation Skills.(ratio:20.00)

E. International Communication and Cooperation Skills.(ratio:10.00)

F. Proactive Lifelong Learning Skills.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:20.00)

3. A vision for the future. (ratio:10.00)

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:20.00)	
	8. A sense of aesthetic appreciation. (ratio:10.00)	

Course Introduction	The course covers classic machine learning models, mainly introducing commonly used classic machine learning models. Including linear regression, support vector machine models, Logistic regression, decision tree model, k nearest neighbor, naive Bayes, Clustering algorithms, support vector machines, etc. In addition, the course also covers deep learning models and methods, analyzing the basic elements of neural networks, and commonly used deep learning models, such as perceptrons, convolutional neural networks, recurrent neural networks, and generative adversarial networks.

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	Conforming the professional features of the departments	Cognitive
2	Establishing the information and network proficiency	Cognitive
3	Students may have the abilities of facing the changing features of networking technology and challenges form information impact.	Cognitive

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

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

		Course Schedule	
Week	Date	Course Contents	Note
1	113/09/09 ~ 113/09/15	Introduction to Machine Learning	
2	113/09/16 ~ 113/09/22	Popular Machine Learning algorithms	
3	113/09/23 ~ 113/09/29	Linear Regression and Ordinary Least Squares (OLS)	
4	113/09/30 ~ 113/10/06	Logistic Regression and MLE	
5	113/10/07 ~ 113/10/13	Linear Discriminant Analysis(LDA)	
6	113/10/14 ~ 113/10/20	Logistic Regression vs LDA	
7	113/10/21 ~ 113/10/27	Naïve Bayes	
8	113/10/28 ~ 113/11/03	Naïve Bayes vs Logistic Regression	
9	113/11/04 ~ 113/11/10	Midterm Exam Week	
10	113/11/11 ~ 113/11/17	Decision Trees	
11	113/11/18 ~ 113/11/24	Bagging	
12	113/11/25 ~ 113/12/01	Random Forest	
13	113/12/02 ~ 113/12/08	Boosting or Ensamble Techniques (AdaBoost, GBM, XGBoost)	
14	113/12/09 ~ 113/12/15	Subset Selection	
15	113/12/16 ~ 113/12/22	Regularization (Ridge and Lasso)	
16	113/12/23 ~ 113/12/29	Dimensionality Reduction (PCA)	
17	113/12/30 ~ 114/01/05	Final Exam Week	
18	114/01/06 ~ 114/01/12	Review Exam	
Key capabilities			
Interdisciplinary			

Distinctive teaching	
Course Content	Computer programming or Computer language (students have hands-on experience in related projects)
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks Name of teaching materials: Hyatt Saleh, Machine Learning Fundamentals, Packt, 2018.
References	
Grading Policy	◆ Attendance： 10.0 ％ ◆ Mark of Usual：25.0 ％ ◆ Midterm Exam： 30.0 ％ ◆ Final Exam： 35.0 ％ ◆ Other 〈 〉： ％
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.**