Course Information	
Course title	Applied Machine Learning
Semester	114-2
Designated for	COLLEGE OF ENGINEERING GRADUATE INSTITUTE OF ENVIRONMENTAL ENGINEERING
Instructor	Ta Fu Dave, Kuo
Curriculum Number	EnvE7097
Curriculum Identity Number	541EM0820
Class	
Credits	3.0
Full/Half Yr.	Half
Required/ Elective	Elective
Time	Friday 7,8,9(14:20~17:20)
Remarks	The upper limit of the number of students: 30.
Course introduction video	
Table of Core Capabilities and Curriculum Planning	Table of Core Capabilities and Curriculum Planning
Course Syllabus	
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Course Description	Introduction to machine learning (ML): core elements and terminologies, underlying mathematical philosophy, solution categories, general work-flow of ML solutions development, and examples of ML-based solutions in various domains. Cover the mathematical bases and algorithms of various supervised and unsupervised learning methods. Discuss and develop ML strategies for selecting/assessing the right ML approach for a given environmental science or environmental engineering problem.
Course Objective	Theory and practice of implementing machine learning (ML) techniques for problems in environmental science and engineering. Discuss the inner workings of various ML algorithms: k-nearest neighbors (k-NN), naive Bayes, decision trees, artificial neural network (ANN), support

	vector machines (SVM), k-means clustering, and more. Emphasis on practical application and techniques with real environmental problems and data.
Course Requirement	No prerequisites.
Student Workload (Expected weekly study hours before and/or after class)	9
Office Hours	Appointment required.
Designated reading	None.
References	Marsland, S. 2015, Machine Learning – An Algorithmic Perspective, CRC Press. Flach P. 2012, Machine Learning, Cambridge.
Grading	1. NTU has not set an upper limit on the percentage of A+ grades. 2. NTU uses a letter grade system for assessment. The grade percentage ranges and the single-subject grade conversion table in the NATIONAL TAIWAN UNIVERSITY Regulations Governing Academic Grading are for reference only. Instructors may adjust the percentage ranges according to the grade definitions. For more information, see the Assessment for Learning Section.

Progress

Week	Date	Topic
Week 1	2/27	Introduction + Navigating in Python
Week 2	3/06	Preliminary to ML
Week 3	3/13	Perceptron
Week 4	3/20	Multi-Layer Perceptron
Week 5	3/27	Radial Basis Functions + Data Tidying
Week 6	4/03	Dimensionality Reduction
Week 7	4/10	Probabilistic Learning
Week 8	4/17	Support Vector Machine + Evolutionary Learning
Week 9	4/24	Reinforcement Learning
Week 10	5/01	Tree Based Methods + Ensemble Learning
Week 11	5/08	Unsupervised Learning
Week 12	5/15	Markov Chain Monte Carlo (MCMC) Methods
Week 13	5/22	Miscellaneous Topics & Conclusion

Week 14	5/29	Miscellaneous Topics & Conclusion
Week 15	6/05	Project Presentation