Spring 2016 SYLLABUS

Course: CIE502-00 Mathematical Methods in Engineering II (응용수학 2)

Instructor: Jooyoung Park   (박주영)

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Textbook: Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer(2006).

Introduction: In CIE502-00 Mathematical Methods in Engineering II, we cover a variety oftopics in mathematical methods for engineering, and in this semester, the main topics of the course are machine learning and stochastic differential equations. The goal of this course is to present students with theoretical fundamentals for various machine learning methods. The second half of the textbook is covered in this course, (The first half of the textbook was covered in the previous course (CIE501-00 Mathematical Methods in Engineering I).

Key words: Machine learning, Pattern recognition, Computational statistics, Applied mathematics.

Prerequisites: Probability, Linear algebra (undergraduate level)

TAs: Jeongho Park

Grading policy: 65% Exam, 35% Final project

Lecture schedule:

Week	Subject	Contents
1	Introduction	Course overview, PGM
2	Special topic: AlphaGo	AlphaGo algorithms
3	Graphical models (ch.8)	PGM
4	Mixture models & EM (ch.9)	MoG, EM
5	Approximate inference (ch.10)	Mean field approach,...
6	Approximate inference (ch.10)	EP,...
7	Sampling methods (ch.11)	Rejection sampling,...
8	Continuous latent variables (ch.12)	PCA,...
9	Continuous latent variables (ch.12)	KPCA,...
10	Sequential data (ch.13)	HMM,...
11	Stochastic differential equations	Stochastic process,...
12	Stochastic differential equations	Brownian motion,...

13	Stochastic differential equations	FPK equation,...
14	Final exam & student feedback	Final exam & student feedback
15	Term project presentation	Term project presentation
16	Term project presentation	Term project presentation