



2018학년도 2학기 강의계획안 (Syllabus)

교과목명 Course Title	Computational Geosciences and Optimization (계산지구과학 및 최적화)	학수번호-분반 Course No.	G17613-01
개설전공 Department/Major	Climate and Energy Systems Engineering (기후에너지시스템공학전공)	학점/시간 Credit/Hours	3.0 / 3.0
수업시간/강의실 Class Time/ Classroom	Tuesday 8, 9 (Eng B Building 153)		
담당교원 Instructor	Name : Baehyun Min (민 배 현)	Department (소속): Climate & Energy Systems Engineering	
	E-mail: bhmin01@ewha.ac.kr	Phone: 02-3277-6946	
면담시간/장소 Office Hours/ Office Location	Hours: Please make an appointment via email or cyber campus Location: JinSunMiGwan Office #237 (진선미관 237호)		

I. 교과목 정보 Course Overview

1. 교과목 개요 Course Description

본 교과목은 다양한 지구과학(지질, 해양, 기상) 분야에서 불확실성 분석을 위하여 활용하여 온 대리 모델, 최적화, 자료 동화, 기계학습 알고리즘 등을 소개하고, 수강생들이 본인 분야에서의 활용방안 탐색을 유도한다. This course aims at training graduate students to practice a variety of algorithms covering surrogate modeling, optimization (global- and multi-objective optimization), data assimilation, and machine learning that have been utilized for modeling geosciences in the areas of subsurface, ocean, and atmosphere.

2. 선수학습사항 Prerequisites

N/A

3. 강의방식 Course Format

강의 Lecture	발표/토론 Discussion/Presentation	실험/실습 Experiment/Practicum	현장실습 Field Study	기타 Other
80%		20%		-

(위 항목은 실제 강의방식에 맞추어 변경 가능합니다.)

강의 진행 방식 설명 (explanation of course format): Powerpoint & Writing on the Whiteboard

4. 교과목표 Course Objectives

The course objective is to encourage students to apply the following techniques in their research area in Geoscience and Engineering:

- Uncertainty Quantification
- Proxy



- Optimization
- Data Assimilation
- Machine Learning

5. 학습평가방식 Evaluation System

중간고사 Midterm Exam	기말고사 Final Exam	발표 Presentation	리포트 Report	과제물 Assignments	참여도 Participation	기타 Others
30%	35%	%	20%	10%	5%	%

(위 항목은 실제 학습평가방식에 맞추어 변경 가능합니다.)

- 절대평가(Absolute Evaluation)
- 지각 1회 = 결석 0.5회. 지각 여부는 수업 시작시간을 기준으로 함.
- 결석 2회 이하는 최종 성적에 영향 없음
- 결석 2회 초과부터는 결석 1회당 최종 성적에서 1점씩 감점 (지각은 1회당 0.5점 감점)
- 결석 5회 초과는 F 학점 부여

“Absolute Evaluation” is the evaluation system of this course. You are encouraged to attend all class sessions. If you have any situation which prevents you from attending class (e.g., illness, family or personal issues, etc.), please let me know your absence via email or message at the Cyber Campus before class in advance. One or two absences do not affect your grade. If you miss three days or more, however, one absence deducts one point from your final score. Two late arrivals are equal to one absence. More than five absences will force you to be given F grade by the university regulation.

II. 교재 및 참고문헌 Course Materials and Additional Readings

1. 주교재 Required Materials

Lecture notes (강의노트)

2. 부교재 Supplementary Materials

S. Mohaghegh, 2017. Data-Driven Reservoir Modeling. SPE.

3. 참고문헌 Optional Additional Readings

III. 수업운영규정 Course Policies

* For laboratory courses, all students are required to complete lab safety training.



IV. 주차별 강의계획 Course Schedule (최소 15주차 강의)

Week	Date	Topics & Class Materials, Assignments (주요강의내용 및 자료, 과제)
1주차	09.04 (Tue)	Introduction and Uncertainty Quantification
2주차	09.11 (Tue)	Proxy: Regression & Response surface modeling
3주차	09.18 (Tue)	Proxy: Response surface modeling & Kriging
4주차	09.25 (Tue)	No class (Thanksgiving Day in Korea)
5주차	10.02 (Tue)	Optimization: Gradient-based method
6주차	10.09 (Tue)	No class (Hangul Day)
7주차	10.16 (Tue)	Optimization: Nongradient-based Evolutionary algorithm
8주차	10.23 (Tue)	Optimization: Global- vs. Multi-objective optimization
9주차	10.30 (Tue)	Midterm Examination
10주차	11.06 (Tue)	Data Assimilation: Ensemble Kalman Filter (EnKF), Ensemble Smoother
11주차	11.13 (Tue)	Data Assimilation: Ensemble Kalman Filter (EnKF), Ensemble Smoother Machine Learning: Neural Network
12주차	11.20 (Tue)	Machine Learning: Neural Network
13주차	11.27 (Tue)	Machine Learning: Fuzzy Logic & Support Vector Machine
14주차	12.04 (Tue)	Machine Learning: Fuzzy Logic & Support Vector Machine
15주차	12.11 (Tue)	Final Examination
16주차	12.18 (Tue)	Term Project Presentation Part II
보강1 (필요시) Makeup Classes	(요일, 장소)	Term Project Presentation Part I (Date and place are TBD)
보강2 (필요시) Makeup Classes	(요일, 장소)	TBD



V. 참고사항 Special Accommodations

* 학칙 제57조에 의거하여 장애학생은 학기 첫 주에 교과목 담당교수와의 면담을 통해 출석, 강의, 과제 및 시험에 관한 교수학습지원 사항을 요청할 수 있으며 요청된 사항에 대해 담당교수 또는 장애학생지원센터를 통해 지원받을 수 있습니다.

According to the University regulation #57, students with disabilities can request special accommodation related to attendance, lectures, assignments, and/or tests by contacting the course professor at the beginning of semester. Based on the nature of the students' requests, students can receive support for such accommodations from the course professor and/or from the Support Center for Students with Disabilities (SCSD).

* 강의계획안의 내용은 추후 변경될 수 있습니다.

* The contents of this syllabus are not final—they may be updated.