교과목번호 Course No.	459.732	강좌번호	-	Title	전산암반공학 Numerical Methods in Rock Engineering	credit	3

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	Office Hours : Through prior appointment	

강의목표 Objective	- This course intends to provide essential concepts of various numerical methods applied in rock mechanics/geomechanics for geo-environmental, civil, mining, and petroleum applications. - This course will cover a wide variety of numerical methods but focus will be given to the finite element and discrete element methods. - Much emphasis is placed on the hands-on experience of applying numerical methods to rock engineering applications of students' own choice. - Students are expected to improve their oral and written communication skills through the preparation of term papers.

교재 Textbook and references	- Lecture notes are the main textbook with the following supplementary references. - Jing, L., 2003, A review of techniques, advances and outstanding issues in numerical modelling for rock mechanics and rock engineering. Int J Rock Mech Min Sci, **40**(3): p. 283-353. - Burnett DS, 1987, Finite Element Analysis - from concepts to applications, Addison-Wesley Publishing Company, 844p - Jing, L. and O. Stephansson, 2007, Fundamentals of Discrete Element Methods for Rock Engineering: Theory and Applications. Elsevier Science

평가방법 Evaluation	Participation	Home Assignment	Final Exam	Term-paper	Sum
	10 %	50 %	20 %	20 %	100%
	비고				

수강생 참고사항 Note to the students	- Lecture will be given in English with some explanations in Korean from time to time. - Students will select their own topics, submit their term papers, and present their work during the student conference. - Home Assignments and exercises include the review of landmark papers on numerical methods, 1D coding of numerical method and modeling exercise using commercial or bespoke numerical codes. - Lectures will be given through ZOOM subject to the situation related to CORONA. - Teaching Assistant: Hwajung Yoo (Building 135) Syllabus last updated: 7 March 2021

부정행위자에 대한 처리 Note about Plagiarism	- Plagiarism is strictly prohibited. - Home assignments and term papers must include 'statement of originality'.

	주(기간)	강의내용
강의 계획 Schedule	week 1 3/8	- Introduction of the course - Numerical approach in rock engineering/Geomechanics
	week 2 3/15	- Finite Element Method (Gallerkin FEM) 　　　　　　- Home assignment #1: Summary of Paper by numerical method
	week 3 3/22	- Finite Element Method (1D)
	week 4 3/29	- Finite Element Method (1D & 2D)
	week 5 4/5	- Finite Element Method (2D)
	week 6 4/12	- Finite Element Method (2D elastic problem) 　　　　　　- Home assignment #2: Coding of FEM program
	week 7 4/19	- Finite Element Method (Exercise, COMSOL)
	week 8 4/26	- Discrete Element Method (Introduction) - Explicit Discrete Element Method (Particulate system) 　　　　　　- Home assignment #3: FEM exercise
	week 9 5/3	- Explicit Discrete Element Method (Blocky system)
	week 10 5/10	- Explicit Discrete Element Method (Blocky system)
	week 11 5/17	- DEM Exercise (PFC, UDEC)
	week 12 5/24	- Discrete Element Method (implicit method: Discontinuous Deformation Analysis and Numerical Manifold Method) by invited speaker (Prof Tomofumi Koyama (Kansai University, Japan, tentative) 　　　　　　- Home assignment #4: DEM exercise
	week 13 5/31	- Presentation of progress of term paper & Consultation with instructor
	week 14 6/7	- Outstanding issues in numerical methods for geomechanics
	week 15 6/14	- Presentation of Term Papers - Final Exam 　　　　　　- Home Assignment #5: Submission and Presentation of Term paper