확장형 수업계획서
(Extended Syllabus)

과목명	Numerical methods for Applications	학기	Spring
구분(학점)	3.0	과목번호	CSE4140
수업시간	Mon, Wed 12:00~13:15)	수강대상	Undergraduate (CS/AI)

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	장소: AS 818 면담시간: TBA	

Ⅰ. 교과목 개요(Course Overview)

1. 수업개요
Nowadays, as the computing power is exponentially increased and computer science becomes ubiquitous in every research field, the major approach of modeling and problem solving in computer science is moving from discrete mathematics to processing and understanding real-valued data. This class is for students who are not familiar with computing with continuous domains which many other scientific and engineering areas addresses. After this course, students will be fluent in the languages of multivariable calculus and linear algebra as much as discrete mathematics.
2. 선수학습내용
This class requires basic knowledges of linear algebra and calculus. And, it is not mandatory but it would be helpful to take computer graphics, and computer vision.

3. 수업방법 (%)

강의	토의/토론	실험/실습	현장학습	개별/팀 발표	기타
50%	%	50%	%	%	%

4. 평가방법 (%)

중간고사	기말고사	퀴즈	발표	프로젝트	과제물	참여도	기타
30	30%				30%	10%	%

Ⅱ. 교과목표(Course Objectives)

Students will learn the numerical programming using Python and basic understanding of its applications in computer science.

Ⅲ. 수업운영방식(Course Format)

This course will be offered during 16 weeks (14 lecture weeks + 2 exam weeks)
For each week, there are two lectures delivered, one for theory and one for programming & practice.

Ⅳ. 학습 및 평가활동(Course Requirements and Grading Criteria)

The course will evaluate exams and assignments.

Ⅴ. 수업규정(Course Policies)

If you do any kinds of cheating, you will get F.

Ⅵ. 교재 및 참고문헌(Materials and References)

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Mathematical Methods for Computer Vision, Robotics, and Graphics, Justin Solomon
https://graphics.stanford.edu/courses/cs205a-13-fall/assets/notes/cs205a_notes.pdf

How to write fast numerical code: A small introduction
https://users.ece.cmu.edu/~franzf/papers/gttse07.pdf

VII. 주차별 수업계획(Course Schedule)

(* 추후 변경될 수 있음)

1 주차 (월/일)	학습목표	Introduction to Numerical Programming
	주요학습내용	Introduction.
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
2 주차 (월/일)	학습목표	Linear System 1: LU Factorization
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
3 주차 (월/일)	학습목표	Linear System 2: Conditioning and Least Square
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
4 주차 (월/일)	학습목표	Linear System 3: Regularization and QR Factorization
	주요학습내용	Searching and Sorting
	수업방법	Lecture and programming practice

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	수업자료	Slide
	과제	
5 주차 **(월/일)**	**학습목표**	Efficient Numerical Code
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
6 주차 **(월/일)**	**학습목표**	Eigen decomposition and Singular Value Decomposition (SVD)
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
7 주차 **(월/일)**	**학습목표**	Non-linear Systems
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
8 주차 **(월/일)**	**학습목표**	Midterm
	주요학습내용	
	수업방법	
	수업자료	
	과제	
9 주차 **(월/일)**	**학습목표**	Optimization and Autodiff
	주요학습내용	
	수업방법	Lecture and programming practice

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	수업자료	Slide
	과제	
10 주차 **(월/일)**	학습목표	Neural Networks
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
11 주차 **(월/일)**	학습목표	Interpolation
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
12 주차 **(월/일)**	학습목표	Integration
	주요학습내용	
	수업방법	
	수업자료	
	과제	
13 주차 **(월/일)**	학습목표	Monte-Carlo Integration
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
14 주차 **(월/일)**	학습목표	Application Practice
	주요학습내용	
	수업방법	Lecture and programming practice

	수업자료	Slide
	과제	
15 주차 (월/일)	학습목표	TBA
	주요학습내용	
	수업방법	Lecture and programming practice
	수업자료	Slide
	과제	
16 주차 (월/일)	학습목표	Final Exam
	주요학습내용	
	수업방법	
	수업자료	
	과제	

Ⅷ. 참고사항(Special Accommodations)

The lecture plan can be adjusted based on students' performance.

IX. 장애학생 지원 사항(Aid for the Challenged Students)

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We will have additional meetings and provide support for challenged students.

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