

Extended Syllabus

Course Title	Computer Vision	Semester	Fall 2024
Credit	3	Course Number	CSE5418/CSEG418/AIE 5105
Class Time	Tue, Thr, 12:00~13:15	Enrollment Eligibility	Undergraduate/ Graduate

Instructor's Photo	Name: Unsang Park (박운상)	Homepage: https://eclass.sogang.ac.kr
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I . Course Overview

1. Description							
In this course, students will understand image formation, representation, and processing, and learn traditional techniques and deep learning based methods to handle various computer vision related problems. General processing methods such as feature extraction from 2D or 3D images and 3D reconstruction problems will also be covered. Students will learn how to solve representative computer vision problems through a number of programming projects.							
2. Prerequisites							
C/C++/Python Programming, Linear algebra, Probabilities/Statistics, Calculus							
3. Course Format (%)							
Lecture	Discussion	Experiment /Practicum	Field study	Presentations	Other		
80%	10%	10%	%	%	%		
4. Evaluation (%)							
Mid-term Exam	Final exam	Quizzes	Presentations	Projects	Assignments	Participation	Other
30%	30%	%	%	30%		5%	5%

II. Course Objectives

This course will help students to understand and raise practical problem solving capabilities in the field of computer vision that gains wide attention these days due to its close relation with artificial intelligence. Students will understand various computer vision related problems, how to solve those problems using traditional and deep learning methods, the limitations and possibilities of those techniques.

III. Course Format

(* In detail)

- Course subjects will be taught by the main and sub textbook and lecture material.
- Couple of projects will be assigned to help understand major concepts in computer vision.

IV. Course Requirements and Grading Criteria

Final grade is based on scores of midterm and final exam, projects, and attendance. All exams and project assignments should be solved by oneself and no cheating activity will be allowed.

V. Course Policies

General rules for late or absence, assignments, projects, and exams will follow the University regulations.

VI. Materials and References

i). Main material

1) Lecture notes

2) Computer Vision: Algorithms and Applications, 2nd ed., Richard Szeliski, 2020
(SzeliskiBookDraft_20210828.pdf, <http://szeliski.org/Book/>)

ii). Sub material

1) Deep Learning, Ian Goodfellow, Yoshua Bengio and Aaron Courville, An MIT Press book in preparation

ii). TA

To be announced later

VII. Course Schedule

(* Subject to change)

Week 1 (dd/mm)	Learning Objectives	Introduction to computer vision
	Topics	Learn basic concepts, history, major problems in computer vision.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 2 (dd/mm)	Learning Objectives	Image formation
	Topics	Learn principles of image formation.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 3 (dd/mm)	Learning Objectives	Camera
	Topics	Learn principles of camera structure.

	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	Project 1: Edge detection
Week 4 (dd/mm)	Learning Objectives	Filters
	Topics	Learn principles of filters.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 5 (dd/mm)	Learning Objectives	Template Filters
	Topics	Learn principles of template filters.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	Project 2: Image classification
Week 6 (dd/mm)	Learning Objectives	Edge Detection
	Topics	Learn principles of edge detection.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 7 (dd/mm)	Learning Objectives	Interest Points
	Topics	Learn principles and applications of interest points.

	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	Project 3: Image classification (deep learning based)
Week 8 (dd/mm)	Learning Objectives	Midterm
	Topics	
	Class Work (Methods)	
	Materials (Required Readings)	
	Assignments	
Week 9 (dd/mm)	Learning Objectives	Interest Points
	Topics	Learn principles and applications of interest points.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 10 (dd/mm)	Learning Objectives	Feature Matching and Fitting
	Topics	Learn principles of feature matching and fitting.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	Project 4: Image stitching
Week 11 (dd/mm)	Learning Objectives	Fitting and Alignment
	Topics	Learn principles of feature fitting and alignment.

	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 12 (dd/mm)	Learning Objectives	Object Detection
	Topics	Learn principles and applications of object detection.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 13 (dd/mm)	Learning Objectives	Recognition
	Topics	Learn principles and applications of recognition in images.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	Project 5: 3D reconstruction
Week 14 (dd/mm)	Learning Objectives	Face Recognition
	Topics	Learn principles and applications of face recognition.
	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 15 (dd/mm)	Learning Objectives	Deep Neural Networks
	Topics	Learn principles and applications of deep neural networks.

	Class Work (Methods)	Lecture
	Materials (Required Readings)	Lecture notes, main/sub textbook
	Assignments	
Week 16 (dd/ mm)	Learning Objectives	Final exam
	Topics	
	Class Work (Methods)	
	Materials (Required Readings)	
	Assignments	

VIII. Special Accommodations

- Meetings will be available by appointments in addition to the office hour.
- Teaching assistant will be announced at the first class.
- Weekly lecture schedule can be changed during the Semester.

IX. Aid for the Challenged Students

- Students who need special care due to any handicap need to contact the instructor individually.