Digital Image Processing

SPRING, 2026

INSTRUCTOR: Lee GU

OFFICE: N525

EMAIL: lee.gu@scupi.cn

OFFICE HOURS: Wednesday 11:30-13:30

LECTURES: S202

RECITATION: TBD

TEXTBOOK: "Digital Image Processing", Kenneth R. Castleman, Prentice Hall International, Inc. 2002.4

TEACHING ASSISTANT:

Ciliang Shao

PREREQUISITE:

Comprehensive Knowledge on computer program language, data structure, computer architecture, and database.

DESCRIPTION:

This course covers the investigation, creation and manipulation of digital images by computer. The course consists of theoretical material introducing the mathematics of digital images. Topics include representation of two-dimensional to 3D image data, image structure, storage and retrieval, filtering and enhancement, convolution, interpolation. The student will become familiar with Image Enhancement, Image Restoration, Image Compression, Morphological Image Processing, Image Segmentation, Representation and Description, and Object Recognition.

COURSE OBJECTIVES:

Introduce the student to analytical tools and methods which are currently used in digital image processing as applied to image information for human viewing. Then apply these tools in the laboratory in image enhancement, image restoration and an introduction to image compression.

LEARNING OUTCOMES FOR THIS COURSE:

1) Understand basic knowledge on the scope of digital image processing.

2) Build skills on working with digital image analysis: digital manipulation of images; image acquisition; preprocessing; segmentation; and compression.

3) Gain experience and practical techniques to write programs for digital image processing.

GRADE DETERMINATION:

EXAMS: 50%

PROJECTS: 40%

ATTENDANCE and DISCUSSION: 10%

MATERIAL COVERED: The sequence of the sections covered in this class is:

Week	Contents	Descriptions
1	Introduction	
2	Threshold and Binary Image	
	Convolution, Correlation	
4	Image Filters	
5	Point Operation	
6	Binary Morphology1	
7	Binary Morphology2	
8	Grayscale Morphology1	
9	Grayscale Morphology2	
10	Grayscale Morphology3	

11	Color image and 3D image	
12	Image segmentation	
13	Image registration	
14	VTK and ITK	
15	Group Presentation	
16	Project Representation	
17	Final Exam	