# 수업계획서 (2000년 2학기)

■ **과목명** : 디지탈영상처리 (Digital Image Processing, DH553)

■ **담당교수** : 전기·컴퓨터공학과 손 광 훈 (孫 光 薰)

■ **Office** : 제3공학관 C125 (Tel: 2123-2879, e-mail: khsohn@yonsei.ac.kr)

■ **강의시간** : 수(6-8 교시, C134)

■ **교재** :

- 주교재:

  "Digital Image Processing" by Gonzalez & Woods

- 참고문헌:

  "Fundamentals of Digital Image Processing" by A. K. Jain
  "Two-Dimensional Signal and Image Processing" by J.S. Lim
  "Digital Image Processing" by W.K. Pratt
  "Digital Image Processing" by K.R. Castleman
  "Digital Image Processing" by G.A. Boxes

■ **강의목표** :

디지탈 흑백/칼라 영상의 특성, 영상변환, 영상개선/복원, 영상압축 및 영상분석을 위한 여러 방식들에 대한 이론을 공부하며, 시뮬레이션을 통해 확인한다.

■ **평가기준** :

중간고사(30%), 기말고사 or 기말 project(40%), homeworks/projects(30%)

■ **주요 강의내용** :

- Introduction
- Digital Image Fundamentals
  - Image Perception
  - Simple Image Model
  - Color Theory
  - Imaging Geometry
- Image Transform
  - 2D Signals & Systems
  - 2D Fourier Transform
  - Sampling & Quantization

    - Image Transforms
- Image Enhancement
    - Point Processing
    - Spatial Filtering
    - Enhancement in Frequency Domain
    - Color Image Processing
    - Edge Detection
- Image Restoration & Filtering
    - Degradation Model
    - Wiener Filter
    - Least Square Solution
    - Optimization
- Image Compression
    - Lossless Compression
    - Lossy Compression
    - Image Compression Standards
- Image Segmentation
    - Thresholding
    - Region-based Segmentation
    - Morphological Segmentation
- Representation and Description
- Recognition and Interpretation
- Image Display
    - Video Input/Output Devices
    - Standard Video Formats

## ■ 영상처리의 역사

- 제1기: 1960년대
  - NASA의 인공위성 영상분석 ('Range' Program)

- 제2기: 1960년대 후반 ~
  - 대학 영상처리 관련 연구실 발족
  - 이론적 접근 방법 연구
  - h/w 시설은 미비된 상태

- 제3기:
  - 디지털 컴퓨터 발달
  - 영상처리 전용 h/w 등장
  - 현재 급속도로 발달 중

## ■ Image (정의, 분류)

- General:
  - any 2-dimensional function bearing information
- Visible:
  - photos, drawings, slides
- Invisible:
  - temperature distribution, population distribution, etc.
- Abstract: mathematical functions
  Physical: matter or energy distribution(e.g. light intensity)
- Static
  Animation
  Moving Pictures
- Single View
  Stereoscopic
  3D(Multi View)
- Single Spectral Sensor
  Multi Spectrum Sensors(e.g. remote sensing)

## ■ What is Image Processing ?

- manipulation and analysis of picutre information
- any operation that acts to improve, correct, analyze
  (or in some way change an image)
- 예:
  - eyeglass prescription (distortion 보정)
  - TV receiver; brightness, constrast, tint, color 조절
    ("looks better" 하도록)
  - human brain; analysis and learning
- most powerful image processing system; human eye and brain !!

- **Optical image processing**:
  - uses an arrangement of optical elements to carry out an operation
  - 예: eyeglass, camera, ...

- **Analog image processing**:
  - uses analog electrical circuits to carry out an operation

- **Digital image processing**:
  - uses digital circuits, computer processors, and s/w to carry out an operation
  - digital technology;
    . precise implementation of image processing functions
    . great flexibility
    . power for general purpose image processing applications
  - 반도체 기술 발전에 편승해 급 부상중
    . computer h/w performance increases
    . declining cost
  - easily stored on magnetic media(transportable)