



VIETNAM NATIONAL UNIVERSITY OF HO CHI MINH CITY  
UNIVERSITY OF NATURAL SCIENCES  
FACULTY OF INFORMATION TECHNOLOGY

**COURSE SYLLABUS**

<b>Course Code:</b>	TH303
<b>Title:</b>	Digital Image Processing
<b>Credits:</b>	4
<b>Workload:</b>	Lecture hours: 3 periods * 15 weeks = 45 periods Laboratory hours: 2 periods * 15 weeks = 30 periods Preparative hours: 2 periods * 15 weeks = 30 periods
<b>Prerequisites:</b>	TH105 – Data structures 2 TH109 – Computer Graphics

**Course Objectives:**

This course is to provide students with the foundations of image processing as well as its techniques to build pictorial information systems.

**Main Text:** N/A

**References:**

- *Digital Image Processing*  
Rafael C. Gonzales, Richard E. Woods, Addison – Wesley Publishing, 1994.
- *Principles of Pictorial Information System Design*  
Shi Kou Chang, Prentice Hall, 1995.
- *Introduction to Computer Graphics and Image Processing (lecture notes, in Vietnamese)*  
Hoang Kiem, Tran Dan Thu, Vu Manh Tong, Ly Quoc Ngoc, Duong Anh Duc, Department of Informatics, Open University, 1995.
- Lecture in Digital Image Processing  
Lý Quốc Ngọc, Hand writing in 2000 and for ever.

**Course Outline:**

Chapter 0 : Overview of image processing and its applications (3 lecture periods + 1 lab period)

Chapter 1 : The basic concepts of Digital Image (6 lecture periods + 4 lab periods)

1. Image functions
2. Color Spaces
3. Basic spatial relationships between pixels
4. Histogram
5. Co-occurrence matrix

6. Distance measures

Chapter 2 : Image pre-processing (6 lecture periods + 4 lab periods)

1. Pixel brightness transformation
2. Geometric transformation
3. Local pre-processing
4. Image restoration

Chapter 3 : Image Segmentation (6 lecture periods + 4 lab periods)

1. Thresholding
2. Edge-based segmentation
3. Region-based segmentation
4. Knowledge-based segmentation

Chapter 4 : Image Transformation (6 lecture periods + 4 lab periods)

1. Fourier Transform
2. Cosine Transform
3. Wavelet Transform
4. Karhunen-Loeve Transform

Chapter 5 : Image Compression(6 lecture periods + 4 lab periods)

1. Lossless compression methods
2. Lossy compression methods

Chapter 6 : Object recognition (6 lecture periods + 4 lab periods)

1. Knowledge representation
2. Statistical pattern recognition
3. Neural nets
4. Fuzzy systems

Chapter 7 : Image understanding (6 lecture periods, 4 lab periods)

1. Symbol grounding
2. Ontology-based approach
3. Image interpretation system

Chapter 8 : Tutorials (3 lecture periods, 2 lab periods)

1. Content-based Image retrieval
2. Content-based Video retrieval
3. Face detection and recognition
4. Digital Image Watermarking
5. Image segmentation
6. Fractal compression

7. Image interpretation

**Grading**

Final exam : 70%

Assignments: 30%