IEE7731: Digital Image Processing (Fall 2014)

Time: 13:20–15:10am, Monday; ED301; 16:30–17:20pm, Thursday; EDB06 (Sept. 15, 2014 – Jan. 12, 2015);

Instructor: Hsueh-Ming Hang 杭學鳴 (x31861) hmhang@mail.nctu.edu.tw

Teaching Assistants: Helen 翁司頻 helen199132@gmail.com ED529 (2EF)
Nick 陳治戎 nickmath15@yahoo.com.tw ED529 (3EF)

Objectives: This course introduces the student to the fundamentals of digital image processing. It covers principles and algorithms used in various image processing applications. Topics include image representation, human visual system, image filtering, restoration, enhancement, segmentation and compression. The course is featured with a series of computer exercises that provide practical experiences on processing digital images using C language and MATLAB. (The lectures are in English.)

Classnotes: By Prof. Sheng-Jyh Wang (王聖智教授) with slight modifications
http://cwww.ee.nctu.edu.tw/

Reference Web: http://www.imageprocessingplace.com/index.htm

Textbook: R.C. Gonzalez and R.E. Woods, ***Digital Image Processing***, 3rd edition, Pearson Education, 2008.

Recommended Readings:

(1) A.N. Netravali and B.G. Haskell, *Digital Pictures*, 2nd Ed., Plenum Press, 1995.

(2) R.C. Gonzalez, R.E. Woods, and S.L. Eddins, *Digital Image Processing Using Matlab*, 2nd Ed., McGraw Hill, 2009.

(3) A. Bovik, *The Essential Guide to Image Processing*, Academic Press, 2009.

(4) R. Szeliski, *Computer Vision*, Springer-Verlag, 2011

Grading: **Homework: 50 %** (~ 3 computer assignments)
Term project: 25%
Examine: 25% (100 mins, open book)

Background: Calculus, Linear algebra, Probability, Signals & Systems, and DSP; **programming in C/C++ and Matlab**

Contents:

1. Introduction
2. Human Visual System
3. Fundamentals
4. Image Transforms
5. Image Enhancement
6. Color
7. Image Segmentation
8. Image Coding
9. Image Restoration
10. Representation & Description
11. Selected Topics

Schedule: Digital Image Processing (Fall 2014)

Week	Month(s)	Days		Remark
1	Sept.	(15), 18	Introduction	9/15 off
2	Sept.	22, 25	Fundamentals	
3	Sept/Oct.	29, 2	Fundamentals, Human Visual System	
4	Oct.	6, 9	Human Visual System	
5	Oct.	13, 16	Image Transforms (HW1)	
6	Oct.	23, 25	Image Enhancement	
7	Oct.	(27, 30)		(ICIP)
8	Nov.	(3, 6)		(UIUC)
9	Nov.	10, 13	Image Enhancement (HW2)	
10	Nov.	17, 20	Color	
11	Nov.	24, 27	Image Segmentation	
12	Dec.	1, (4)	Image Segmentation (HW3)	(GlobSIP)
13	Dec.	8, (11)	Image Coding; **Exam (12/11)**	(APSIPA Conf)
14	Dec.	15, 18	Image Coding; Image Restoration	
15	Dec.	22, 25	Image Restoration (HW4)	
16	Dec/Jan.	29, (1)	Representation & Description	1/01 Holiday
17	Jan.	5, 8	Representation & Description	
18	Jan.	12, 15	**Project Oral Report**	

Exam: Dec. 11? (Class Notes); 100 mins; open book – textbook and class notes

Project Oral Report: 30 mins. per group (15 mins. each person)

Project written report due Jan. 16.