

In the name of Allah

40-823+ Advanced Digital Image Processing

Course Syllabus

Term:

Fall 1386 (2007)

Instructor:

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Lecture:

Saturdays & Mondays, 15:00-16:30, Room Motalea 2.

Website:

The course website can be found at:

<http://ce.sharif.edu/courses/86-87/1/ce823/>

Please check this site often for important *announcements*, files needed for computer exercises, and the PDF versions of *handouts & homework*.

Course Description:

40-823 + provides an insight to advanced image processing theory and techniques.

Topics include: 2-D system theory, 2-D random processing, image transforms with particular emphasis on wavelet transform, advanced image enhancement, advanced image filtering and restoration, advanced image analysis, image/video compression, biometric techniques, advanced motion estimation, content-based image retrieval, and image/video watermarking.

Prerequisites:

40-763 (Digital Signal Processing) or 40-933 (Digital Image Processing).

Credit:

3 units.

Text Book:

Fundamentals of Digital Image Processing, by Anil K. Jain, Prentice Hall, 1989, ISBN: 0013-336165-9.

Additional topics will be included (e.g., video compression standards, wavelet transform, ...).

Reference Books:

1. *Computer Imaging: Digital Image Analysis and Processing*, by Scott E. Umbaugh, CRC Press, 2005, ISBN: 0-8493-2919-1.
2. *A Study Guide for Digital Image Processing*, by Mark J. T. Smith and Alen Docef, Scientific Publishers, 1999.
3. *Digital Image Processing*, by Rafael C. Gonzalez & Richard E. Woods, Addison-Wesley, 2nd edition, 2002, ISBN: 0201180758.

4. *Digital Image Processing using Matlab*, by Rafael C. Gonzalez, Richard E. Woods, & Steve L. Eddins, Prentice-Hall, 1st edition, 2003, ISBN: 0130085197.
5. *Digital Image Processing*, by William K. Pratt, John Wiley & Sons Inc., 3rd edition, 2001.
6. *Algorithms for Image Processing and Computer Vision*, by J.R. Parker, John Wiley & Sons, 1996, ISBN: 0471140562.
7. *Multidimensional Digital Signal Processing*, by Dan E. Dudgeon & Russel M. Mersereau, Prentice-Hall, 1984.
8. *Two-Dimensional Signal & Image Processing*, by J. S. Lim, Prentice-Hall, 1990.
9. *Two-Dimensional Imaging*, by Ronald N. Bracewell, Prentice-Hall, 1995.
10. *Computer & Robot Vision*, by Robert M. Haralick & Linda G. Shapiro, Addison-Wesley, 1993.
11. *Computer Vision*, by Dana H. Ballard & Christopher M. Brown, Prentice-Hall, 1982.
12. *Handbook of Pattern Recognition & Image Processing*, by Tzay Y. Young & King-Sun Fu, Academic Press, 1986.
13. *Video Processing & Communications*, by Yao Wang, Jom Ostermann, & Ya-Oin Zhang. Prentice Hall, 1st edition, 2001, ISBN: 0130175471. [SUT: TK 5105 .2 .W36 2001]
14. *Digital Video Processing*, by A. Murat Tekalp, Prentice Hall, 1995, ISBN: 0-13-190075-7.
15. *Image and Video Compression for Multimedia Engineering: Fundamentals, Algorithms, and Standards*, by Yun Q. Shi & Huifang Sun. CRC Press, 2000, ISBN: 0-8493-3491-8. (QA 76 .575 .S555 1999 C.2)
16. *A Wavelet Tour on Signal Processing*, by Stephane Mallat, Academic Press, 2nd edition, 1999, ISBN: 0-12-466606-X.
17. *Wavelets and Subband Coding*, by Martine Vetterli & Jelena Kovacevic, Prentice Hall, 1995, ISBN: 0-13-097080-8.
17. *Probability, Random Variables, & Random Signal Principles*, by Peyton Z. Peebles, JR., McGraw-Hill, 3rd edition, 1993, ISBN:0-07-112782-8.
19. *Probability, Random Variables, & Stochastic Processes*, by Athanasios Papoulis, McGraw-Hill, 1991 (QA 273 .P2 1991).

Written Homework Problems:

Written homework problems will be assigned by the end of each chapter.

Computer Exercises:

Computer assignments will also be assigned over the course. They can be provided either in Matlab or C Languages.

Course Project:

There will be a course project, which can be proposed by the student. Students are supposed to present the final result, associated with related software & technical report.

Exams:

There will be one midterm and one final exam.

Grading Policy:

Written & computer assignments: 3 Points
 Term project: 3 Points
 Project report: 1 Point
 Project presentation: 1 Point
 Midterm exam: 3 Points (held at: *Monday 1386.8.28*)
 Final exam: 9 Points (held at: *Saturday 1386.10.22, 14:30*)
 Class activities: 1 Point

Project Topic Confirmation Due:

Final exam day (not confirmed course projects are not acceptable).

Instructor Office Hour:

Wednesdays, 15:00-16:00, Room 307, CE, SUT.

Teaching Assistants:

Ms. H. Mohseni, Mr. M. Fotouhe, and Mr. H. Ajorlou