CSC6860-001 Digital Image Processing & Analysis

Fall Semester, 2017

Course information:

Course Call #: 13291
Course #: CSC6860-001
Credits: 3
Day: Mondays & Wednesdays
Room: 0135 State Hall
Hours: 2:30pm to 3:45pm

Instructor information:

Instructor: Dr. Ming Dong
Office: 5057 Woodward, Suite 14110.1
Office hours: Monday 1:30pm-2:30pm, Wednesday 1:30pm-2:30pm or by appointment
Telephone: 313-577-0725
Email: mdong@cs.wayne.edu
Personal Web page: http://www.cs.wayne.edu/~mdong
Course Web page: WSU Blackboard http://blackboard.wayne.edu/
(Please read it regularly to find important information regarding the class such as slides, homework, projects, etc.)

Course Description:

The course provides overview and in-depth discussion in the following topics: image formation and acquisition; architecture for image processing, image transformation; image enhancement and restoration; image compression; morphological image processing.

Required Textbook:


Recommended Textbook:


References:

- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Image Processing
- Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- Proc. IEEE International Conference on Computer Vision (ICCV)
- Proc. ACM Multimedia
- Proc. IEEE Conference on Image Processing (ICIP)

**Prerequisites:**

1. Graduate Standing
2. Linear algebra
3. Digital signal processing: continuous & discrete Fourier transforms, convolution, and digital filtering

**Course Learning Objectives:**

Upon successful completion of this class, the student will be able to:

1. Understand the basics and the architecture of digital image processing systems. (Chapter 1)
2. Understand the fundamentals of image formation and image processing. (Chapter 2)
3. Understand the theory of image enhancement and transforms, and implement corresponding algorithms in a high level programming language. (Chapter 3 & 4)
4. Understand the theory of image restoration, reconstruction, and compression, and implement corresponding algorithms in a high level programming language. (Chapter 5 & 8)
5. Understand the theory of wavelets and multi-resolution processing, and implement corresponding algorithms in a high level programming language. (Chapter 6)
6. Understand the basics of color image processing. (Chapter 7)

The instructor reserves the right to vary the level and depth of the material covered in order to adapt the course to the background and level of the students.

**Assessment and Grading policies:**

Class attendance: 5%
Homework (4 assignments/projects): 25%
Midterm exam (close book): 35%
Final exam (close book): 35%


Homework and exams will have different difficult levels for graduate and undergraduate students. That is, students need to show a higher level of understanding of the topics to earn graduate credits. The instructor reserves the right to adjust the grades.
Computer Programs:

Students implement image processing algorithms in a high level language. Matlab is highly preferred. Simple tutorials of programming by Matlab will be given in class.

Religious Holidays:

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:

• If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

• Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Policy on Academic Dishonesty - Plagiarism and Cheating:

You should complete your homework assignments, programming assignments and exams independently. No discussion in any format is allowed unless you are informed otherwise. It is the student's responsibility to familiarize himself or herself with the consequences of academic dishonesty.

Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing
grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- **Cheating:** Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

- **Fabrication:** Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

- **Plagiarism:** To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

- **Other** forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

**Course Drops and Withdrawals:**

In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at:

http://reg.wayne.edu/pdf-policies/students.pdf

**Student services:**

- The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit www.success.wayne.edu for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).
• The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit http://clasweb.clas.wayne.edu/writing to obtain information on tutors, appointments, and the type of help they can provide.

**Class recordings:**

Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.