

COSC-4301
Digital Image Processing
Fall, 2017
12:45-2:05pm, Tuesdays and Thursdays

Instructor: Dr. Jing Zhang,
Assistant Professor, Computer Science
Maes Building, Room 72
(409) 880-7995
jing.zhang@lamar.edu

Office hours: anytime by email and in person from 2:30am to 4:30 on TR

Course objectives: This course is an introduction to digital image processing. Digital images are an important form of data in many fields. Image processing is the study of the algorithms that take images as input and produces new images as output. In this course, we will talk about the basic algorithms of image processing, including image enhancement, image filtering, feature detection, Fourier transform, geometric transforms, color processing, and image compression. The goal of this course is to give students the understanding of how image processing algorithms work and what algorithms to apply for solving a given problem, as well as the necessary foundation to develop new image processing algorithms.

Pre-requisite: COSC 2336 (Data Structures) and COSC 2375 (Discrete Structures)

Student learning outcomes: Students who successfully complete the course should be able to:

- Understand basic image processing algorithms;
- Analyze images in spatial and frequency domains;
- Extract features from images;
- Know the general steps to develop image processing algorithms;
- Write image processing programs in MATLAB programming language;
- Implement image processing projects;

Course materials:

Textbook:

- Gonzalez, Rafael C., and Richard E. Woods. *Digital image processing*. 3rd Edition, Prentice-Hall, Inc., 2007. ISBN-13: 9780131687288

Optional materials:

- Milan Sonka, Vaclav Hlavac, and Roger Boyle, *Image processing, Analysis, and Machine Vision*, 4th Edition, 2014 ISBN-13: 978-1133593607.
- Online resources, such as: the ACM digital portal and the IEEE digital portal

Grading criteria:

The grade for the course will be based on assignments, quizzes, project, midterm and final written exams with percentages assessed as follows:

- Assignments 25% (all assignments weighted equally)
- In-class quizzes 10% (all quizzes weighted equally)

- Midterm exam 30%
- Final exam 35%

1. You are expected to keep an active participation throughout the duration of the semester course. Failure to do so will result in reduction of your grade.
2. No curve is guaranteed. However, if a curve is justified to be used at the end of the semester, then it will be applied to your final average.
3. The letter grade will be determined as follows:
Grade: A=90%-100%, B=80%-89.9%, C=70%-79.9%, D=60%-69.9%, F=below 60%

Course Outline:

- 1 Introduction
- 2 Image Perception
- 3 Image Sampling and Quantization
- 4 Feature Detection
- 5 Image Enhancement in Spatial Domain and Frequency Domain
- 6 Image Transforms
- 7 Image restoration
- 8 Color Image
- 9 Image Compression

Policies:

1. Assignments that are turned in late will be assessed with the following late penalty applied to the score received:
 - 1 day late (Immediately after the deadline up to 24 hours later): -10%
 - 2 days late: -25%
 - 3 days late: -30%
 - > 3 days late: -100% (we will not accept it).
2. In-class quizzes may not be announced ahead of time. It is important to attend class regularly so no quizzes are missed. Missed quizzes cannot be made up unless the student has an official university excuse for missing class.
3. There is no make-up final exam unless you have a DOCUMENTED medical or personal EMERGENCY.
4. The final project cannot be turned in late.
5. All work in this course is to be your own. Anyone caught copying, plagiarizing or otherwise cheating on a homework assignment will get a 0 on that assignment. Anyone caught copying, plagiarizing or otherwise cheating on the final exam will get an F in the course. The same applies to those who allow their materials to be copied.
6. Attendance Policy: Students are expected to attend every class and are solely responsible for anything missed in the class. Poor attendance will ultimately be reflected in the course grade. Therefore, an 'A' student must attend all classes and actively provide thoughtful, relevant comments to class discussions.
7. The Campus Closure Policy: In the event of an announced campus closure in excess of four days due to a hurricane or other disaster, students are expected to login to Lamar University website's homepage (www.lamar.edu) for instructions about continuing courses remotely.

Students with disabilities:

Lamar University is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is located in the Communications building room 105. Office staff collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

For students:

- If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at 409-880-8347 or drc@lamar.edu to arrange a confidential appointment with the Director of the DRC to explore possible options regarding equitable access and reasonable accommodations.
- If you are registered with DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

Please notify the Professor during the first week of class regarding accommodations needed for the course. The Professor will make reasonable accommodations for students with documented disabilities.

Emergency Procedures

Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at:

<http://www.lamar.edu/about-lu/administration/risk-management/index.html>. Following are procedures for the first two:

Severe Weather:

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

Violence/Active Shooter (CADD):

- CALL** - 8-3-1-1 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- AVOID**- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- DENY**- Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.
- DEFEND**- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.