Course Syllabus

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[CS 640] Syllabus

Old Dominion University

College of Sciences

Department of Computer Science

CS 640: Digital Image Processing and Applications

Syllabus

Dr. Soad Ibrahim

Instructor: Dr. Soad Ibrahim

Office: Dragas 1100A

Office Hours: I plan to use Zoom for my office hours every week. *Please use the following link to book a meeting with me* **"Book an Appointment".** **(https://outlook.office.com/bookwithme/user/9dae8993f4514b41ab20e0d178a31028@odu.edu/meetingtype/6MJg_Ldw-EW3DGuWgYcAVg2?bookingcode=34a6318f-199e-4722-a23d-cd0f242cfc29&anonymous&ismsaljsauthenabled&ep=mLinkFromTile)**

Email: **sfibrahi@odu.edu (mailto:sfibrahi@odu.edu)**

Contact Policy:

Please make sure **to include your name and CS 640 in the subject line** of your email.

Catalog Course Description:

CS 640. Digital Image Processing and Applications. 3 Credits.

Laboratory work required. The course covers digital image processing techniques including representation, sampling and quantization, imaging geometry, image transforms, image enhancement, image filtering, color image processing, image segmentation, and morphological image processing. Applications include image restoration, image compression, pattern recognition, and image fusion. Prerequisites: Prior programming experience.

Course Objectives: This course will provide an introduction to digital image processing using Matlab. At the conclusion of this course the student should be able to:

- Discern digital image representation and electromagnetic spectrum
- Examine the different applications of image processing field
- Discover how images can be handled as matrices, and how the manipulation of these matrices
- Read and write images with different formats
- Investigates aspects of image display and looks at resolution and quantization and how these affect the appearance of the image.
- Change spatial resolution of an image and recognize the effect on the image
- Get the image histogram
- Use histogram stretching and histogram equalization to improve the images
- Use histogram matching with multiple images
- Apply single and double thresholding to isolate objects in images
- Discover the difference between image convolution and correlation
- Apply spatial filtering on images
- Discern the different types of image noises
- Remove salt and pepper noise from an image
- Remove Gaussian noise from an image
- Detect the edges in images using different methods
- Apply different mathematical morphology techniques to analyze shapes in images
- Process colored images
- Convert the images between different color models
- Design a basic Image Processing App using Matlab App Designer

Optional Textbook:

McAndrew, Alasdair. *A Computational Introduction to Digital Image Processing*.

2nd Edition

Chapman and Hall/CRC

2015

ISBN-10: 1482247321

ISBN-13: 978-1482247329

CANVAS**:** You should check CANVAS for announcements concerning course assignments. Grades will be posted on CANVAS. It is the student's responsibility to inform the instructor of misreported grades within **three days** after they are posted on CANVAS.

Grades: Each of the following components will contribute the indicated percentage to your overall grade.

Assignments	70%
Image Processing App	10%
Presentation	10%
Final Exam	10%

Total	**100%**

Letter Grade:

Percent Scored	Grade
95 - 100	A
90 - 94	A-
87 - 89	B+
83 - 86	B
80 - 82	B-
77 - 79	C+
73 - 76	C
70 - 72	C-
67 - 69	D+
63 - 66	D
60 - 62	D-
0 - 59	F

Makeup policy:

A late penalty of 50% will be applied for work (Assignments, Presentation, Image Processing App, and Final exam) turned in late, **within 1 calendar day** of the original due date.

You may not make up exams without **prior arrangements**, a written medical excuse or a documented emergency. Such arrangements **must** be made with the **Student Ombudsperson Services Office**. Please follow the university rules at the following links:

https://www.odu.edu/about/monarchcitizenship/class-attendance/absences (https://www.odu.edu/about/monarchcitizenship/class-attendance/absences)

Old Dominion University is committed to students' personal and academic success. In order to achieve this vision, students, faculty, and staff work together to create an environment that provides the best opportunity for academic inquiry and learning. All students must be honest and forthright in their academic studies. Your work in this course and classroom behavior must align with the expectations outlined in the Code of Student Conduct, which can be found at **www.odu.edu/oscai (http://www.odu.edu/oscai)** . The following behaviors along with classroom disruptions violate this policy, corrupt the educational process, and will not be tolerated.

Cheating: Using unauthorized assistance, materials, study aids, or other information in any academic exercise.

Plagiarism: Using someone else's language, ideas, or other original material without acknowledging its source in any academic exercise.

Fabrication: Inventing, altering or falsifying any data, citation or information in any academic exercise.

Facilitation: Helping another student commit, or attempt to commit, any Academic Integrity violation, or failure to report suspected Academic Integrity violations to a faculty member.

Academic dishonesty will be reported to the Office of Student Conduct & Academic Integrity and may result in sanctions up to and including expulsion from the University.

By attending Old Dominion University, you have accepted the responsibility to abide by the honor code. If you are uncertain about how the honor code applies to any course activity, you should request clarification from the instructor. The honor code is as follows: ***"I pledge to support the honor system of Old Dominion University. I will refrain from any form of academic dishonesty or deception, such as cheating or plagiarism. I am aware that as a member if the academic community, it is my responsibility to turn in all suspected violators of the honor system. I will report to Honor Council hearings if summoned."***

Any evidence of academic dishonesty will result in a 0 grade for the assignment/exam, and the incident will be submitted to the department for further review. Evidence of academic dishonesty may include a student being unable to satisfactorily answer questions asked by the instructor about a submitted solution. For class files kept in UNIX space, students are

expected to use UNIX file permission protections (chmod) to keep other students from accessing the files. Failure to adequately protect files may result in a student being held responsible for giving unauthorized assistance, even if not directly aware of it.

Students may still provide legitimate assistance to one another. You are encouraged to form study groups to discuss course topics. *Students should avoid discussions of solutions to ongoing assignments and should not, under any circumstances, show or share code solutions for an ongoing assignment.*

Please see the ODU Honor Council's webpage for other concrete examples of what constitutes cheating, plagiarism, and unauthorized collaboration. *All students are responsible for knowing the rules.* If you are unclear about whether a certain activity is allowed or not, please contact the instructor.

You can read more the code of student conduct at the following website:

https://www.odu.edu/oscai (https://www.odu.edu/oscai)

Important Notes:

1. Use of ChatGPT and similar such tools is strictly prohibited.
2. Use of ChatGPT and such tools may be used to get some ideas, but the work submitted must be students' own.
3. Use of ChatGPT and such tools is permitted, but students must properly cite the sources of that, and any other code found on the Internet, according to the guidelines provided below. [followed by examples of using comments in code to cite sources of both quoted and paraphrased sections].

Special needs:

Old Dominion University is committed to ensuring equal access to all qualified students with disabilities in accordance with the Americans with Disabilities Act. **The Office of Educational Accessibility (OEA)** is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations.

The Office of Educational Accessibility is located at 1021 Student Success Center and their phone number is (757)683-4655. Additional information is available at the OEA website: **http://www.odu.edu/educationalaccessibility/ (https://www.odu.edu/educationalaccessibility)**

- If you experience a disability which will impact your ability to access any aspect of my class, please present me with an accommodation letter from OEA so that we can work together to ensure that appropriate accommodations are available to you.
- If you feel that you will experience barriers to your ability to learn and/or testing in my class but do not have an accommodation letter, please consider scheduling an appointment with OEA to determine if academic accommodations are necessary.

Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

ODU's Office of Counseling Services

ODU's Office of Counseling Services (OCS, 1526 Webb University Center) is a university agency with competent, diverse, and multidisciplinary professional staff. We are committed to supporting the emotional well-being, social development, and academic progress of all students at Old Dominion University.

College life can be a wonderful time of self-discovery, but for many, it is also a time when the awareness of mental health conditions increases. OCS services are available to assist with addressing mental health concerns that a student may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via our website at: **http://www.odu.edu/counselingservices (http://www.odu.edu/counselingservices)** . All services are free to ODU students.

NOTICE/disclaimer: This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. These plans may change depending on factors outside of the faculty member's control. **The instructor reserves the right to modify, supplement and make changes as course needs arise**.

Course Summary:

Date	Details	Due
Sun Aug 31, 2025	**Assignment 1** (https://canvas.odu.edu/courses/187857/assignments/2840520)	due by 11:59pm
Sun Sep 7, 2025	**Assignment 2** (https://canvas.odu.edu/courses/187857/assignments/2840522)	due by 11:59pm
Sun Sep 14, 2025	**Assignment 3** (https://canvas.odu.edu/courses/187857/assignments/2840523)	due by 11:59pm

Date	Details	Due
Sun Sep 21, 2025	Assignment 4 (https://canvas.odu.edu/courses/187857/assignments/2840524)	due by 11:59pm
Sun Sep 28, 2025	Assignment 5 (https://canvas.odu.edu/courses/187857/assignments/2840525)	due by 11:59pm
Sun Oct 5, 2025	Assignment 6 (https://canvas.odu.edu/courses/187857/assignments/2840526)	due by 11:59pm
Sun Oct 19, 2025	Assignment 7 (https://canvas.odu.edu/courses/187857/assignments/2840527)	due by 11:59pm
Sun Oct 26, 2025	Assignment 8 (https://canvas.odu.edu/courses/187857/assignments/2840528)	due by 11:59pm
Sun Nov 2, 2025	Assignment 9 (https://canvas.odu.edu/courses/187857/assignments/2840529)	due by 11:59pm
Sun Nov 9, 2025	Assignment 10 (https://canvas.odu.edu/courses/187857/assignments/2840521)	due by 11:59pm
Sun Nov 16, 2025	Image Processing App (https://canvas.odu.edu/courses/187857/assignments/2840532)	due by 11:59pm
Sun Nov 23, 2025	Presentation (https://canvas.odu.edu/courses/187857/assignments/2840533)	due by 11:59pm
Fri Dec 5, 2025	Course Survey (https://canvas.odu.edu/courses/187857/assignments/2840530)	due by 11:59pm
	Extra Credit: Image Compression (https://canvas.odu.edu/courses/187857/assignments/2840531)	due by 11:59pm
	Standalone Application (https://canvas.odu.edu/courses/187857/assignments/2840534)	due by 11:59pm
Sun Dec 7, 2025	Final Exam (https://canvas.odu.edu/courses/187857/assignments/2840519)	due by 3pm