Image Processing and Computer Vision
EEE 6512 Sections 012A, 013D, 19DF, 2G34
Class Periods: Mon., Weds, and Fri., Period 5, 11:45 AM – 12:35 PM
Location: NEB 100
Academic Term: Fall 2017

Instructor:
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Teaching Assistants:
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- Office Hours: Tues. 3:00 PM – 5:00 PM, Thurs. 4:00 PM – 6:00 PM or by appointment, 413 New Eng. Bldg.

Course Description

Pictorial data representation; feature encoding; spatial filtering; image enhancement; image segmentation; cluster seeking; two-dimensional z-transforms; scene analysis; picture description language; object recognition; pictorial database; interactive graphics; picture understanding machine.

Credits: 3

Course Pre-Requisites / Co-Requisites

- EEE-5502 Foundations of Signal Processing
- Undergraduate-level probability and statistics course
- Undergraduate-level linear algebra course
- Exposure to MATLAB programming

Course Objectives

This course introduces students to the fundamental principles and methods used for image processing and computer vision. The goal of this course is to understand how to efficiently represent, process, and analyze image signals. The objective of the course is to provide students with the scientific foundations needed to implement and apply techniques used to address image analysis related problems. Topics to be covered include: image acquisition and display using digital devices, properties of human visual perception, sampling and quantization, image enhancement, two-dimensional Fourier transforms, linear and nonlinear filtering, morphological operations, noise removal, image deblurring, edge detection, geometric transformations, segmentation, and object recognition (classification). The course objective will be met by the completion of multiple homework assignments which require the implementation and

application of image processing / computer vision methods discussed during lecture. Also, the students' understanding of the main concepts will be assessed using multiple exams.

Materials and Supply Fees
None

Required Textbooks and Software
- Title: Image Processing and Analysis
- Author: Stan Birchfield
- Publication date, edition, and publisher: 2017, First Edition, CL Engineering
- ISBN number: 978-1285179520

Software: Mathematical solver software such as MATLAB (available at UF ECE terminal server available by remote login)

Recommended Materials
None

Course Schedule (Tentative)
Week 1: Course Overview, Introduction, Fundamentals of Imaging Pt. 1
Week 2: Fundamentals of Imaging Pt. 2, Image Transformations Pt. 1 / **Homework #1 Due**
Week 3: Image Transformations Pt. 2
Week 4: Binary Image Processing /**Homework #2 Due**
Week 5: Spatial Domain Filtering / **Exam #1**
Week 6: Frequency Domain Processing Pt. 1 / **Homework #3 Due**
Week 7: Frequency Domain Processing Pt. II /
Week 8: Edges and Features / **Homework # 4 Due**
Week 9: Image Compression
Week 10: Color/ **Exam #2**
Week 11: Segmentation Pt. 1 / **Homework #5 Due**
Week 12: Segmentation Pt. 2
Week 13: Model Fitting Pt. 1/ **Homework #6 Due**
Week 14: Model Fitting Pt. 2/
Week 15: Classification /**Exam #3**

Attendance Policy, Class Expectations, and Make-Up Policy
Although attendance will not be recorded, it is expected that students attend all lectures. Excused absences are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Students are expected to take measures to minimize distractions for everyone (i.e. no newspapers, cell phone, PDA, laptops, etc. unless instructed to use them for class.

Makeup exams are contingent on appropriate justifications and legal documents (UF Dean of Students, certified physician, military active duty, judge for jury duty, etc.) Late assignments **will not** be accepted.

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework Sets (6)	50%
Exams (3)	50%
TOTAL	100%

Grading Policy

Percent	Grade	Grade Points
94 - 100	A	4.00
90 – 93	A-	3.67
88 – 89	B+	3.33
82 – 87	B	3.00
80 – 81	B-	2.67
78 – 79	C+	2.33
72 – 77	C	2.00
70 – 71	C-	1.67
62 – 69	D	1.00
0 – 61	E	0.00

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Campus Resources:

Health and Wellness

> **U Matter, We Care:**
> If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.
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> **Counseling and Wellness Center:** http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
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> **Sexual Assault Recovery Services (SARS)**
> Student Health Care Center, 392-1161.
>
> **University Police Department** at 392-1111 (or 9-1-1 for emergencies), or
> http://www.police.ufl.edu/.

Academic Resources

> **E-learning technical suppor***t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
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> **Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.
>
> **Library Support**, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
>
> **Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.
>
> **Writing Studio, 302 Tigert Hall***, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.
>
> **Student Complaints Campus***:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
>
> **On-Line Students Complaints***:* http://www.distance.ufl.edu/student-complaint-process.