Syracuse University
Department of Electrical Engineering and Computer Science

CSE/ELE 400/691 Image and Video Processing
Spring 2017
Preliminary Syllabus

Location	Link Hall 114
Time	12:30pm-1:50pm Tuesday and Thursday
Class Number	34520 (CSE 400), 34560 (CSE 691), 34521 (ELE 400) and 34561 (ELE 691)
Instructor	Dr. Senem Velipasalar, Associate Professor
	Office: 3-183 Center for Science and Technology
	Phone: 443-4418
	E-mail: svelipas@syr.edu
	Office Hour: 11:30am-12:30pm on Thursday or by appointment.
Course Website	http://blackboard.syr.edu
Prerequisites	Moderate level of programming (Matlab or C/C++), fundamentals of probability theory, matrix algebra or permission.
Course Objectives & Learning Outcomes	Students will learn and understand

Students will learn and understand

- the various application areas of image and video processing, and computer vision,
- the principles of image formation, and nature of digital images and their acquisition,
- image histograms and histogram processing,
- the basics of image restoration, and be able to perform noise filtering,
- red eye removal, and be able to implement a red eye removal algorithm,
- feature detection, and be able to implement edge and corner detection,
- deformable contours, and be able to implement, evaluate and analyze the algorithm,
- recognition techniques, including Principal Component Analysis (PCA), and be able to implement a face recognition system by using PCA,
- background subtraction techniques and be able to implement the codebook algorithm for moving object detection,
- morphological operations,
- learn object tracking techniques, and be able to describe challenges that need to be addressed by a tracking algorithm,

Suggested Readings

Introductory Techniques for 3-D Computer Vision by Emanuele Trucco, Alessandro Verri. Prentice Hall, 1998.

Computer Vision: A Modern Approach by David A. Forsyth and Jean Ponce. Prentice Hall, second edition, 2011.

Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods. Prentice Hall, 2007.

Course Outline	This course will discuss basic concepts of image and video processing, and $3D$ computer vision. Topics will include low-level image processing methods, such as noise filtering, histogram processing and feature detection, recognition techniques including Principal Component Analysis (PCA), background subtraction methods for moving object detection in videos, object tracking techniques, and multi-camera systems. Feature detection will cover edge, corner, line and curve detection. Deformable contours will be introduced for curve detection and description. A red eye removal algorithm will also be discussed.
	Some of these topics correspond to *Chapters 1-5 and 8* of the book by Trucco and Verri. We will also be reading related papers for the other topics, which will be provided in PDF format.

Grading

- Assignments   70%
- Final Project   30%

Course Policies

- Students can discuss assignments with each other, but everyone should write their own code and submit their own assignment. Students may not use other people's code.
- For each assignment, students should prepare a document containing their results, analysis of the results and their comments. They should put their code and this document in a folder. Zipped version of this folder should be submitted via Blackboard before noon on the due date.
- Students will have two late days that they can use any time during the semester. No late reports will be permitted for the final project.
- For the final project, students can collaborate within groups comprised of at most 2 students.
- Class attendance is expected.

Academic Integrity	The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort.
Students with Disabilities/ Special Needs	Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor. Accommodations, such as exam administration, are not provided retroactively; therefore, planning for accommodations as early as possible is necessary.