

# CS 7640: Advanced Image Processing

## Administrative Details and Syllabus Spring 2017

**Course Web Page:** <http://www.sci.utah.edu/~fletcher/CS7640/>

**Introduction.** In-depth study of advanced methods and research topics of current interest in image processing and analysis. Covers PDEs, shape representations, deformable models (snakes, level sets), statistical shape analysis, scale-space and registration. Focus and list of topics might change from semester to semester.

**Instructor.** Tom Fletcher. *Office:* 4686 WEB. *Email:* [fletcher@cs.utah.edu](mailto:fletcher@cs.utah.edu). *Office Hours:* Wed. 3:00–4:00pm, or by appointment.

**Class Meetings.** Tuesdays and Thursdays, 3:40 pm – 5:00 pm, in WEB 1250.

**Announcements.** Important announcements, such as assignment corrections or deadline changes, will be sent to the class via the Canvas announcements for this class. Make sure that you have setup Canvas to send you announcements to an email address that you will check regularly, as they may be time-sensitive.

**Grading Policy.** The final course grade is based on the projects (70% total), presentation (20% total), and class participation (10%). Letter grades are assigned as follows:

		87-89	B+	77-79	C+	67-69	D+		
93-100	A	83-86	B	73-76	C	63-66	D	0-59	E
90-92	A-	80-82	B-	70-72	C-	60-62	D-		

Homework assignments are due at 11:59pm on the given due date. Written assignments should be in PDF format, while coding assignments should be source files. Coding can be done in any programming language you want, e.g., R, MATLAB, C/C++, Java, etc. You may not use outside code or packages that solve any part of the assignment.

**Late Policy.** Late projects will be deducted -10pts the first 24 hours they are late and -20pts for 24-48 hours late. Projects will not be accepted beyond 2 days late. You will get one “free pass” where you can turn in one of the projects up to a week late without a reduction in points.

**Working Together.** Students are welcome and encouraged to discuss course topics and project assignments outside of class. However, each student is required to write their own code and project reports. *Do not copy another student’s code or report, and do not copy code or text from outside sources.* Such copying will be considered cheating and will result in a failing grade in the course. For a detailed description of the university policy on cheating, please see the University of Utah Student Code: <http://www.admin.utah.edu/ppmanual/8/8-10.html>.

**Students with Disabilities.** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union

Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

**Syllabus.** The following topics will be covered. See the course web page for a detailed schedule.

- *Feature Detection*
  - *Scale space*
  - *Gaussian derivatives*
  - *Nonlinear scale space and anisotropic diffusion*
  - *Differential invariant structure*
- *Image Registration*
  - *Deformable registration*
  - *Atlas building*
  - *Mutual information*
- *Shape Analysis*
  - *Shape representations*
  - *Theory of shape spaces*
  - *Shape statistics (means, variability)*
- *Segmentation*
  - *Level set segmentation (PDE)*
  - *Deformable models*
  - *Markov random fields*
  - *Mean shift*