E&CE-417: Image Processing*

Department of Electrical and Computer Engineering
University of Waterloo
Winter 2017

Course outline: This course introduces the basic theories and methodologies of digital image processing. Topics include intensity transformations for image enhancement, two-dimensional discrete Fourier transform, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics.

Prerequisite: ECE 207, MATH 213 or equivalent.

Antirequisite: CS-473, SYDE-575.

Course website: `www.ece.uwaterloo.ca/~ece417`.

Instructor: Dr. Oleg Michailovich (office: EIT 4127, ext.: 38247, olegm@you_know_where.ca)

Textbook: Lecture notes/slides will be posted online. Recommended (optional) reading:

- A. K. Jain, Fundamentals of Digital Image Processing, *Prentice Hall*, 1989.
- K. R. Castleman, Digital Image Processing, *Prentice Hall*, 1996.
- B. Jane, Digital Image Processing: Concepts, Algorithms, and Scientific Applications, *Springer Verlag*, 1995.
- R. C. Gonzalez and R. E. Woods, Digital Image Processing, *Prentice Hall*, 2008.

Homework Assignments: Both paper and computer homework assignments will be posted online. Computer homework makes use of MATLAB as an analysis, design, and visualization tool.

Reasons to Take the Course: Students are expected to be able to understand and implement (using software) a number of useful algorithms to solve real-world image processing problems. Examples include: how to remove noise from an image; how to sharpen a blurred image; how to automatically detect edges and segment objects from an image; and how to estimate motion in a video. Students who are preparing for the job markets of the digital image/video processing, digital imaging, computer vision, and multimedia industries, or are interested in pursuing graduate studies in related areas should consider taking the course.

*In Winter 2017, the course will be offered under a temporary code ECE 493 (special topics).