ECE 468 Digital Image Processing

ECE 468 Digital Image Processing (3). Introduction to digital image processing including fundamental concepts of visual perception, image sampling and quantization, image enhancement in spatial and frequency domains (through 2D Fourier transform), image restoration, and color image processing. Implementation of algorithms using Matlab Image Processing Toolbox. Lec. Enforced Prereqs: ECE 351 and ECE 352

Prerequisites: ECE 351 and ECE 352 (enforced)

Courses that require this as a prerequisite: ECE 568

Credits: 3 **Structure:** three 50 min lectures per week **Terms Offered:** Fall

Instructors: Primary: L. Lucchese Secondary: E. Mortensen

Contents:

1. CCD and CMOS imaging sensors
2. Color imaging sensors
3. Color demosaicking
4. Image sampling and quantization
5. Image equalization
6. Hstogram processing
7. Image enhancement, both in the spatial domain and in the frequency domain (through 2D Fourier transform)
8. Ideal, Gaussian, and Butterworth 2D lowpass, highpass, bandpass, and bandreject filters
9. Noise characterization, periodic noise and random noise
10. Image restoration
11. 2D deconvolution,
12. Inverse filtering, Wiener filtering, constrained least squares filtering
13. Geometric transformations
14. 2D interpolation
15. Image registration and mosaicking
16. elements of human visual perception
17. Fundamentals of color image processing (filtering, enhancement, denoising)

Measurable Student Learning Outcomes:

Students should demonstrate the ability:

1) to acquire the fundamental concepts of a digital image processing system (ABET outcomes i, j, k, l)
2) to identify and exploit analogies between the mathematical tools used for 1D and 2D signal analysis and processing (ABET outcomes a, b, e)
3) to analyze 2D signals in the frequency domain through the Fourier transform (ABET outcomes b, m , n)

4) to design and implement with Matlab algorithms for digital image processing operations such as histogram equalization, enhancement, restoration, filtering, and denoising (ABET outcomes a, c, e, k, l, m)

Evaluation of Student Performance

- Projects: 30%
- Take-home midterm exam: 45%
- Final Quiz: 25%

Learning Resources:

- Textbook –***Digital Image Processing, 2nd Edition***, by Gonzalez and Woods, Prentice Hall, 2002.
- Matlab Image Processing Toolbox

Students with Disabilities

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Link to Statement of Expectations for Student Conduct, i.e., cheating policies
http://oregonstate.edu/admin/stucon/achon.htm