EECE 5520 – Digital Image Processing

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Course Description:

Theory and practice of image digitization, processing, coding and analysis. Representations of images, image models. Techniques of image enhancement and restoration. Image compaction and coding. Segmentation and image understanding. Students have the opportunity to experiment with several image processing techniques using the MATLAB Image Processing Toolbox.

Topics explored include: the human visual system, spatial sampling and digitization, image transforms, spatial filtering, Fourier analysis, image enhancement and restoration, nonlinear and adaptive filters, color image processing, geometrical operations and morphological filtering, image coding and compression image segmentation, feature extraction and object classification. Applications in medical imaging and video processing are emphasized and presented as illustrative examples.

Additional Details:

Simple examples using MATLAB, C/C++ and CUDA will be used to demonstrate key concepts of the course. Example source code will be shared from the class GitHub repository, and students will have access to the necessary hardware and software for implementation. Class notes and lecture recordings will be shared on D2L. Assignments will be given at least 2 weeks prior to the due date.

Additional expected learning outcomes for graduate students are to analyze and think critically to apply knowledge, skills, and values appropriate to Digital Image Processing. In addition, graduate students should master new and various methods and technologies at an advanced level.

Location & Schedule:

Class meets in EHALL 323 on Mondays & Wednesdays: 5:00pm-6:15pm

Grading:

Homework and Projects: 60%
Mid-term exam: 20%
Final exam: 20%

Recommended Texts:

Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing,* 4rd edition, 2017.
ISBN: 9780133356724

Rafael C. Gonzalez, Richard E. Woods, et al., *Digital Image Processing with MATLAB, 3rd* edition, 2020.
ISBN: 9780982085417

Other Notes:

Students are required to comply with all policies outlined in the Graduate Bulletin, including the Marquette University Honor Code and Honor Policy.

Office Hours:

By appointment; using Microsoft Teams or in-person Haggerty Hall – Room 235

Contact Info:

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