0301-803 – DIGITAL VIDEO PROCESSING I

Instructor: Dr. Eli Saber          Office Hours: TBD
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Course Structure: Lecture Hours = 4 hrs/wk, Total Credits = 4
Pre-requisites: Digital Image Processing or permission of the instructor

Course Description:

1) Representation of digital video: Introduction and fundamentals
2) Time-varying image formation models: Motion models, Geometric image formation.
3) Spatio-temporal sampling: Sampling of analog and digital video, Two-dimensional rectangular and periodic sampling, Sampling of 3-D structures, Reconstruction from samples.
4) Sampling structure conversion: Sampling rate change, Sampling lattice conversion
5) Two-Dimensional Motion Estimation: Optical flow based methods, Block-based methods, Pel-recursive methods, Bayesian methods based on Gibbs Random Fields.
6) Image Compression: Lossless compression, DPCM, Transform coding, JPEG, Vector Quantization, Subband Coding.
7) Video compression (If time allows): Interframe compression methods (3-d waveform and motion-compensated waveform coding), Video compression standards (H.261, MPEG-1, MPEG-2).


Reference Books:

5) J. Lim, “Two-Dimensional Signal & Image Processing”, Prentice Hall.
Preliminary Grading Policy:

Homework & Projects 15%
Midterm Exam 30%
Comprehensive Final 30%
Individual Term Project 15%
Active Learning Quizzes 10%

Course Grade Evaluation Criteria:

1) Homework & Matlab Projects: Homework & Matlab projects will be assigned throughout the course and will be collected on the agreed upon due date.
2) Exams: Two exams will be given during the quarter. The exams will be based on the homework, lectures, projects, and assigned reading as well as relevant topics in 1D and 2D signal processing.
3) Grading: The grade will be generated using the above percentage weights. An appropriate curve will be utilized for the class.

General Guidelines:

1) Please do not wait to the last minute to do the homework, projects or study for the exams.
2) It is highly recommended that you make every effort to attend every lecture. The material covered in the lecture is designed to focus on the most pertinent concepts of the course. If you should miss a lecture, please make every effort to get a copy of the lecture material from your fellow students.
3) If you are having trouble with the material or need more personal attention, please do not hesitate to make use of my office hours as early as possible. Please do not wait to the last minute.
4) KGCOE academic honesty policy will be strictly enforced.