Master Course Description

No: EE 58H

Title: DIGITAL VIDEO PROCESSING

Credits: 3

Catalog Description: Introduction to video formation and visual perception. Fourier analysis of video signals. Video sampling and sampling rate conversion. Video modeling (Camera, illumination, object, Scene). Motion estimation. Video coding (Waveform based, content based) and overview of video compression standards. Video distribution over IP.

Coordinator: Burak Acar, Ph.D., Assistant Professor of Electrical Engineering

Goals: Its goals are to introduce the primary digital video processing techniques for acquisition, representation, processing and communication. The students will understand the digital video, its basic problems and solution approaches.

Learning Objectives:

At the end of this course, the students will develop skills regarding the basic video processing tasks. Specifically, they will get acquainted with:

1. Digital video acquisition and representation
2. Fourier analysis, sampling
3. Motion estimation
4. Video coding and compression

Textbook: *Video Processing and Communications*, Y. Wang, J. Ostermann, Y.Q. Zhang, Prentice-Hall, 2002.

Reference Texts:

1. Tekalp, *Digital Video Processing*, Prentice Hall, 1995.
2. *Digital Image Processing*, Rafael C. Gonzalez and Richard E. Woods, Second Edition, Prentice-Hall, 2001
3. *Digital Image Processing with Matlab*, Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, First Edition, Prentice-Hall, 2004.

Prerequisites: EE373, EE475(suggested), EE473(suggested)

Topics:

- Video formation and representation
- Fourier analysis and sampling
- Video modeling
- Motion estimation
- Video coding
- Video compression standards

Course Structure: The class meets for three lectures a week, each consisting of two 50-minute sessions.

Computer Resources: The course material, whenever needed, will be distributed through the course website.

Laboratory Resources: The Matlab tutorials.

Grading:

1. Midterm Exam (30%)
2. Final Exam (30%)
3. Computer Assignments (40%)

Outcome Coverage:

(a) Apply math, science and engineering knowledge.

(c) Design a system, component or process to meet desired needs. The students will need to consider all of the DIP tools and concepts they are introduced to design a complete DIP system for the assignments they will be given. The choice of the system components, each component's specific settings, etc. will need to determined to get the desired results.

(e) Identify, formulate and solve engineering problems. In parallel with the above items, the course will give the students the ability to see real life problems in terms of the knowledge they have and transform the problem into the technical language and apply their knowledge to solve it.

(k) Use the techniques, skills and modern engineering tools necessary for engineering practice. The assignments will not only be graded on a theoretical basis but also on the quality of the end product. This depends on the students' ability to use current engineering tools, preferably in Matlab environment.

Prepared By: Burak Acar **Last revised:** February 11, 2008