CSCI 576 – Multimedia Systems Design, Fall 2011

Instructor: Gérard G. Medioni
Email: medioni@usc.edu
Office Hours: TBA
Office Location: PHE 212
Department Office Phone: (213) 740 6440
Class location:

Teaching Assistant:

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Course Objective:

This course covers the state-of-the-art technology for multimedia systems. We will study all aspects of the different media types images, video, audio, graphics etc and how they are used to create multimedia content, compress and distribute them via networked system to variety of end clients. This includes issues related to

- Content creation - media capture and representation, methods to assemble media types to create multimedia content.
- Compression / Storage - We will also study the algorithms, protocols architectures related to compression.
- Distribution – Aspects of wired and wireless network distribution, Quality of Service, as well as digital rights management of distributed multimedia (watermarking & encryption)

For each of the above ISO and ITU standards will also be addressed. These include JPEG, MPEG1, MPEG2, MPEG4, H.261, H.263, H.264, G.711, G.722, mp3, AAC, Dolby AC3, THX, surround sound etc. We will also study applications and systems around multimedia – such as database applications with metadata (MPEG-7, MPEG-21). The courses goal will also be to explain modern distributed multimedia systems that take the some or all of the above components to create practical applications eg multimedia authoring, digital cinema, content management, multimedia databases, etc.

Prerequisites:

There are no special prerequisites are necessary, but it is imperative that you have

- Good Programming Skills (you should be comfortable with programming)
- Basic Math Skills
- It will be helpful if you have some background in any of the following - signal and image processing, graphics, video processing, audio processing, networks. All necessary material will be introduced in the course.

Course Requirements:

You will be evaluated as follows:

One mid term exam	(20% of your grade) – *Nov 2011*
One end term exam	(20% or your grade) – *Dec 2011*
Two Assignments	(25% of your grade)
One project	(25% of your grade) – *Dec 2011*
Attendance and participation	(10% of your grade)

The tentative week by week set of lectures

Intro
Digital Data Acquisition and Media Basics (chap 2 and 3)
Color (Chap 4)
Compression Overview (Chp 6)
Image Compression (Chap 7)
Video Compression (Chap 8)
Video Compression - contd and Audio Compression(Chap 9)
Audio Compression (Chapter 9)
Midterm
Graphics Compression
MPEG-4
Wired and wireless networking
DRM

Textbooks:

Required textbook : *Multimedia Systems – Algorithms, Standards and Industry Practices*. *by Parag Havaldar and Gerard Medioni*
Available in the bookstore or online. Additional material (such as selected articles, recent research papers) will always be provided during the course.

Here are a few books that cover some parts of the course material. I am providing this list only for reference; The required text, the class notes, research papers/articles and web pointers are enough for you to get an "A" in the course.

- Ze Nian Li , Mark S. Drew, *Fudamentals of Multimedia*, Prentice Hall, 2004
- S.V. Raghavan, S.K. Tripathi, *Networked Multimedia Systems: Concepts, Architecture, and Design*. Prentice Hall, 1998
- F. Kuo, W. Effelsberg, J.J. Garcia-Luna-Aceves, *Multimedia Communications: Protocols and Applications.* Prentice Hall PTR, 1998
- David S Taubman, Micheal W. Marcellin, JPEG 2000 – Image Compression, Fundamentals, Standards and Practice, Kluwer Academic Publishers 2002
- Mohammed Ghanbari, *Video Coding – An Introduction to Standard Codecs*. The Institution of Electrical Engineers (IEE), London, UK, 1999.
- A. Puri, T. Chen (eds.), *Multimedia Systems, Standards, and Networks.* Marcel Dekker, 2000
- Ming-Ting Sun, Amy R. Reibman (eds.), *Compressed Video over Networks*. Marcel Dekker, 2000
- Marin Bosi and Riach E. Goldberg, *Introduction to Digital Audio Coding and Standards*, Kluwer Academic Publishers 2003
- Foley, Van Dam, Feiner, Hughes, Computer Graphics – Principles and Practice, Second Edition. Addison-Wesley – 1990.

Academic Integrity

The USC Student Conduct Code prohibits plagiarism. All USC students are responsible for reading and following the Student Conduct Code, which appears in the SCampus. Although we encourage discussions among students, all work submitted for the class is to be done individually, unless an assignment specifies otherwise. Some examples of what is not allowed by the conduct code: copying all or part of someone else's work, and submitting it as your own; giving another student in the class a copy of your assignment solution; consulting with another student during an exam. If you have questions about what is allowed, please discuss it with the instructor. Violations of the Student Conduct Code will be filed with the Office of Student Conduct, and appropriate sanctions will be given.