Catalog Description: Design and implementation of multimedia communication systems. Image compression, JPEG, VQ, Cell-B standards. Video and audio compression standards, MPEG, MPEG-2, H.26X, G.72X. Data Storage systems and multimedia requirements. Networking requirements and networks as multimedia carriers. Transport and network protocols for carrying multimedia over data networks. Multimedia system design, scheduling, congestion control, traffic shaping, buffer management.

Credits 3

Prerequisite by topic: Probability and statistics, Fourier transform, Time domain and Frequency domain analysis, Computer organization, Knowledge of Matlab, introductory level Computer Networks

Prerequisite by course: Credit or concurrent registration in Computer Engineering 560

Course Coordinator: Dr. Sunil Kumar, Office: E 202-A; Email: skumar@mail.sdsu.edu

Class Schedule  
| TTh | 2:00 – 3:15 pm in P-149 |

Office Hours  
| MW | 3:00 – 4:00 pm and TTh 4:00- 5:00 pm (for other times, please send email for appointment) |

Course Objectives:

1. Introduction of multimedia data (e.g., image, audio and video) characteristics
2. Discussion of computing and networking requirements for multimedia data.
3. Learn lossless data compression techniques, such as Huffman codes, arithmetic codes, predictive coding, LZW codes.
4. Learn theoretical foundations of transform coding and image compression technology.
5. Write matlab program to compress digital images using DCT based transform coding.
7. Write matlab program for motion estimation and motion compensation in digital video.
8. Write matlab program for motion compensated transform coding for video files.
9. Learn theoretical foundations of speech and audio compression technology.
10. Introduction to design considerations for multimedia communication systems.
11. Introduction to video distribution network and the networking resources needed to satisfy given delay, utilization, packet loss and delay jitter parameters.


Note: Lecture notes, Lecture audio, and Papers distributed by the instructor are usually sufficient for this course without the textbook.

Topics Covered

1. Introduction to multimedia
2. Lossless data compression techniques, such as Huffman codes, arithmetic codes, predictive coding, LZW codes.
3. Transform coding and image compression technology, including JPEG and JPEG2000.
4. Motion estimation, compensation and video compression technology, including MPEG, MPEG-4, and H.26X coding standards.
5. Speech and audio compression, including G series standards
6. Introduction to multimedia system design
7. Introduction to networked multimedia applications

**Exams and Grading Policy:** There will be two in-class midterm exams and a final exam. If you must miss an in-class exam for some compelling and unavoidable reasons, please inform the instructor well in advance so that an early exam can be administered. Please note that the Make-up Exam shall be given only in exceptional situations, with prior permission.

Midterm 1: Thursday, Feb. 26 (22%, closed book/notes)
Midterm 2: Thursday, April 9 (22%, closed book/notes)
Final: Tuesday, May 12, 1:00 - 3:00 pm (26%, closed book/notes)

Homework/Projects: 30% (Four Homework Assignments, involving Matlab code)
Classroom Performance: 5% (bonus for participating in the class-room discussions during lecture)

Written request for *regrading* the homework and exams *must* be submitted during the class on the same day they are returned.

The use of laptops and other electronic gadgets is not permitted during lectures.

**Plagiarism:** There is a strong penalty for cheating and plagiarism in home assignments and exams. Please see SDSU policy for details on cheating and plagiarism.