Aim

- The course is an advanced graduate level course that covers the concepts and principles that underlie the delivery of multimedia services and contents such as digital audio and video across modern packet-switched computer networks and wireless networks with the required quality of service.

Outline

1. Overview of the course
2. Introduction
   a. Media
   b. Networking principles
   c. IP networks
   d. Multimedia networking
3. Fundamentals of Multimedia
   a. Characteristics of Audio, Image and Video Signals
   b. Audio Compression
   c. Image Compression
   d. Video Compression
4. Fundamentals of Next Generation Networks
5. Quality of Service
   a. Principles (e.g. Admission Control and Shaping/Policing)
   b. QoS Architecture (Integrated services; Differentiated services)
   c. Traffic engineering (Fair Scheduling)
   d. Flow and congestion control (Buffer Management)
   e. Error Correction, Error Concealment
6. Multimedia over IP
   a. IP multicast
   b. Multimedia over Overlay networks
7. Multimedia Applications: Streaming (Real-time)
8. Multimedia Protocols
   a. Signaling Protocols (SIP, H.323)
   b. Streaming (Real-time) Protocols (RTP, RTCP)

9. Multimedia over Wireless/ sensor network

10. Multimedia Networking Applications
    a. Digital TV
    b. Voice Over IP
    c. IPTV Audio/video Conferencing

11. Multimedia Network Security
    a. Encryption
    b. Digital signatures
    c. Authentication
    d. IP security
    e. Digital watermarking
    f. Secure media streaming

12. Content Networks

13. Multimedia Networks: Methodology Design

14. Hot Research Topics

Evaluation Criteria
Based on Homework, Quizzes, Critical Reading, Project, Mid-Term and Final Exams. The grade will be determined by (You will learn how to use OPNET-SPGURU for design/simulation assignments: therefore attending the TA sessions is mandatory)

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>30%</td>
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<tr>
<td>Quiz</td>
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<tr>
<td>Critical Reading</td>
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<tr>
<td>Mid-Term Exam</td>
<td>25%</td>
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<td>Final Exam</td>
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<td>Project</td>
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References
Multimedia deals with a variety of different technologies and those technologies advance very quickly. Consequently, no single textbook exist that may cover all the topics we would like to cover in this course. Therefore, the course materials will be drawn from different resources including reference books, Internet, my own research and technical papers. Students are encouraged to study using class handouts, which will be posted on the course website and will cover all the course material needed. Additional material (such as selected articles, recent research papers) will be provided during the course. Selected chapters from the following text books will be used to complement the course material: