CS4285: HIGH SPEED MULTIMEDIA NETWORKS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
High Speed Multimedia Networks

Subject Code
CS - Computer Science

Course Number
4285

Academic Unit
Computer Science (CS)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
CS3201 Computer Networks or EE3009 Data Communication Protocols or (EE3015 Computer Networks and EE2371 Data Communication Laboratory)

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil
Part II Course Details

Abstract

The course aims to provide an up-to-date knowledge of high-speed networks to students. The course covers basic concepts, architectures, protocols, advantages and limitations, and recent development of various high-speed networking technologies; and how the various networks cope with multimedia data transmission and some multimedia applications in both wired and wireless environments. The current and future developments in high-speed networks are discussed. Multimedia applications such as Video on Demand, and multimedia streaming are also discussed.

Course Intended Learning Outcomes (CILOs)

<table>
<thead>
<tr>
<th>CILOs</th>
<th>Weighting (if app.)</th>
<th>DEC-A1</th>
<th>DEC-A2</th>
<th>DEC-A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understand the design of high-speed LAN and link layer to support multimedia and real-time traffic and applications.</td>
<td>20</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Understand the quality of service (QoS) parameters for multimedia traffic and the various trade-off.</td>
<td>20</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>Evaluate the network technologies for satisfying particular QOS requirements.</td>
<td>10</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>Understand the mechanisms to admission control and congestion control.</td>
<td>10</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5</td>
<td>Understand the mechanism/protocol to conduct the multimedia streaming in high speed wired and wireless networks.</td>
<td>20</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>6</td>
<td>Illustrate the Integrated services and differentiated services in related to QoS communications.</td>
<td>20</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing/constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

<table>
<thead>
<tr>
<th>TLAs</th>
<th>Brief Description</th>
<th>CILO No.</th>
<th>Hours/week (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>Explain the basic concepts of various technologies to better support multimedia streaming.</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
</tbody>
</table>
### 2 Tutorial
- **Show how to apply the knowledge learned in lectures to solve problems.**
- **CILO No.:** 1, 2, 3, 4, 5, 6
- **Weighting (%):** 8 hours/semester

### 3 Homework
- **Test students’ understanding on the knowledge learned in lectures and train the students with independent thinking.**
- **CILO No.:** 1, 2, 3, 4, 5, 6
- **Weighting (%):** 0.5

### 4 Group project
- **Allow students to create practical and innovative voice over IP application using the real-time streaming protocols learned in lectures.**
- **CILO No.:** 2, 3, 5
- **Weighting (%):** 0.5

### Assessment Tasks / Activities (ATs)

<table>
<thead>
<tr>
<th>ATs</th>
<th>CILO No.</th>
<th>Weighting (%)</th>
<th>Remarks (e.g. Parameter for GenAI use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Homework</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2 Quiz</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>3 Group project</td>
<td>2, 3, 5</td>
<td>10</td>
<td></td>
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</tbody>
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### Continuous Assessment (%)
- 30%

### Examination (%)
- 70%

### Examination Duration (Hours)
- 2

### Additional Information for ATs
For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

### Assessment Rubrics (AR)

**Assessment Task**
- Homework

**Criterion**
The ability to solve problems using the knowledge learned in lectures

**Excellent (A+, A, A-)**
- High

**Good (B+, B, B-)**
- Significant

**Fair (C+, C, C-)**
- Moderate
Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Quiz & Final Exam

Criterion
The ability to solve problems using the knowledge learned in lectures

Excellent (A+, A, A-)
High

Good (B+, B, B-)  
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Group presentation

Criterion
The ability to innovatively create real-time streaming applications

Excellent (A+, A, A-)
High

Good (B+, B, B-)  
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels
Part III Other Information

Keyword Syllabus
Fundamentals of high speed network architectures and protocols, Link-layer addressing, Inter-networking, Multimedia communications, Quality of Services, Integrated and differentiated services, Resource allocation and traffic control, Dynamic routing protocols, Audio and video media transport in packet networks, Multimedia transmission in wired and wireless networks.

Syllabus
An architecture and paradigm of various high speed networks will be presented during the lectures, with discussion of the following issues and the related techniques/algorithms:
- Basic issues of concepts of high speed networks: characteristics, ATM and high speed LAN.
- Congestion and traffic management: the concepts and techniques in general, multiple access control.
- Multimedia networking: streaming audio and video.
- Protocols for interactive streaming for both audio and video.

Reading List

Compulsory Readings

<table>
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<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Nil</td>
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Additional Readings

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<th>Title</th>
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