**Part I Course Overview**

**Course Title**
Distributed System Technologies and Programming

**Subject Code**
CS - Computer Science

**Course Number**
4273

**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**
EE3009 Data Communication Protocols or
EE3015 Computer Networks or equivalent

**Precursors**
Nil

**Equivalent Courses**
Nil

**Exclusive Courses**
EE4216 Internet Client-Server Computing
Part II Course Details

Abstract
This course aims to provide introduction to advanced Internet technologies and programming. Students will gain the knowledge about fundamental concepts of distributed systems, distributed system architecture, and communications between different components of distributed systems. Students will also learn the programming skill and train their problem solving ability about development of distributed systems, web-based information systems, and networking systems. We will explore the state of art of distributed systems and web-based information systems. Specifically, we will discuss the programming of clients, middle tier servers and application servers in great details.

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. Describe HTTP protocols, web-based systems and Internet services.</td>
<td>10</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Describe the fundamental concepts and design principles of the above.</td>
<td>10</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Investigate and design web-based information systems and explore new system technologies.</td>
<td>20</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4. Program client-server systems by using communication protocols.</td>
<td>20</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5. Design and implement multi-threading server programs.</td>
<td>20</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>6. Evaluate and design multi-tier web-based information systems.</td>
<td>20</td>
<td>x</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. Lecture</td>
<td>Explain concepts of distributed systems and programming.</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>3 hours/week</td>
</tr>
<tr>
<td>2. Tutorial</td>
<td>Require students participate in problem solving of distributed system design.</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>8 hours/semester</td>
</tr>
<tr>
<td>3. Group Project</td>
<td>Design, program, and test of distributed systems.</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>6 hrs/wk for 6 weeks (2 projects)</td>
</tr>
</tbody>
</table>
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>Two projects</td>
<td>1, 2, 3, 4, 5, 6</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

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
Projects

Criterion
1.1 ability to understand concepts of distributed systems
1.2 ability to design, program and test of distributed system
1.3 ability to solve problems in design of systems

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not reaching marginal level

Assessment Task
Examination

Criterion
2.1 ability to understand and explain concepts of distributed system
2.2 ability to design and develop distributed systems in details

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant
Part III Other Information

Keyword Syllabus
WWW, HTTP, telnet, SMTP, HTML, XML, Java event model, Java GUI, Java Applet, Java Servlet, JSP (JavaServer Page), Client-server model, Socket API, CGI (Common Gateway Interface), thread, JDBC (Java Database Connection), RMI (Remote Method Invocation).

Syllabus
- WWW, HTTP protocol, HTML and XML
- Java Event model and Java GUI
- Java Applet programming
- CGI (Common Gateway Interface) programming
- Sockets communication and client-server programming
- Java Servlet and JSP (JavaServer Page)
- Multi-threading and concurrent programming
- Java Database Connections (JDBC), 2-tier / 3-tier system design
- Java RMI (remote method invocation)

Reading List

Compulsory Readings

<table>
<thead>
<tr>
<th>Title</th>
</tr>
</thead>
</table>

Additional Readings

<table>
<thead>
<tr>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
</tr>
</tbody>
</table>