

**King Fahd University of Petroleum and Minerals
Information and Computer Science Department**

ICS 571 Client Server Programming (3 Credit Hours) - Fall 2016

Course Description

Introduction to Clients, Servers, and Protocols. Client-Server Architectures. Software Architectures for Clients and Servers. Network and Operating System Support for Client-Server Applications. Programming language support. Standard interfaces and API. Examples of clients and servers for several popular protocols such as X, POP3, news, ftp, and http. Project(s).

Instructor Info.

Dr. Nasir Darwish (office: 22/309, phone: 8602942)
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Office hours: MW: 1:00 pm – 2:00 pm

Grading Policy

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| Assignments | 30% |
| Midterm Exam | 25% |
| Project | 15% |
| Final Exam | 30% |

Course Prerequisite

Good in programming using Java or C#. Basic knowledge about TCP/IP networks.

Useful References

1. Node.js in Practice. Manning (2015).
2. High Performance Browser Networking. O'Reilly (2013).
3. Understanding TCPIP. Packt Publishing (2006).
4. TCP/IP Sockets in C#. Morgan Kaufmann (2004).
5. Professional .NET Network Programming. APress (2002).

Course Syllabus*

| Module and Duration | Topics |
|--|--|
| <p>TCP/IP Model and Protocols, Web Architecture, HTTP Clients and Servers (6 lectures)</p> | <p>TCP/IP Model and Protocols. Web Architecture. Client-Server Architecture. Overview of HTTP and HTML. HTTP Protocol structure. HTTP Message Formats. HTTP Methods and Headers. Persistent vs. Nonpersistent HTTP Connections Pipelined HTTP Connections. Cookies Role and Uses for HTTP Proxy. Caching Proxies Intercepting HTTP Messages. Hands-on demonstration of software development tools including WebMatrix and Node.js.</p> |
| <p>Web APIs, Tools and Techniques (6 lectures)</p> | <p>HTML form processing. The .NET Networking classes: WebClient, WebRequest, WebResponse. User Authentication, Cookies, AJAX, JSON, REST, WebSockets. WebSockets Handshake. WebSockets API.</p> |
| <p>Advanced Programming Concepts (3 lectures)</p> | <p>Defining and Using Delegates Multicast Delegates. Asynchronous Method-Invocation Asynchronous Notification via Callbacks. How and Why Use Multithreading. Downside to Multithreading. Deadlock Process/Thread Priority. Creating and Launching Threads. Passing Data to a Thread. Thread Synchronization. Thread-Safety of .NET Collections</p> |
| <p>Sockets Interface and Applications (6 lectures)</p> | <p>Concepts of C/S programming: Sockets, Ports, Connection. The Sockets interface. .NET classes: TCPClient versus TCPListener. Multithreaded TCP Servers. Advantages and applications of UDP. Problems associated with UDP applications and how to handle them. Controlling Socket Behavior using Socket Options. Catching Errors. Broadcasting advantages over unicasting. Addresses used for Multicasting. Internet Group Management Protocol (IGMP). Developing UDP servers/clients using UdpClient and Socket classes from .NET.</p> |
| <p>Internet Mail Protocols (3 lectures)</p> | <p>SMTP Servers and Clients. Mail Header Format. SMTP Commands and Responses. SMTP Extensions for Authentication. MIME. Base64 Encoding Quoted-Printable Encoding. POP3 Commands and Responses. POP3 States. The .NET classes for Constructing and Sending Mail Messages using SMTP.</p> |
| <p>Cloud Computing & Virtualization (3 lectures)</p> | <p>Cloud Computing: delivery models, deployment models, and characteristics Pricing Models. Advantages and Disadvantages of Cloud Computing. Benefits and Uses of Virtualization. Types of Hypervisors. VMDK versus VHD. Snapshotting. Examples of Virtualization Software</p> |

* Based on two lectures per week