<table>
<thead>
<tr>
<th>Course Number</th>
<th>CS 412</th>
<th>Course Title</th>
<th>Programming Distributed Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester Hours</td>
<td>3</td>
<td>Course Coordinator</td>
<td>Chun Hsi-Huang SP20</td>
</tr>
<tr>
<td>Catalog Description</td>
<td>This course uses advanced features of the Java programming language to develop networked, distributed, and web-based applications. Topics covered include, but are not limited to, sockets, datagrams, the Java security model, threads, multi-tier architectures, Java RMI, Java database connectivity, and Java-based mobile agents.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Textbooks**


**References**


**Course Learning Outcomes**

- To learn to develop network and distributed applications and network components.
- To learn advanced topics in Java.

**Assessment of the Contribution to Student Outcomes**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Prerequisites by Topic**

CS 306 with a grade of C or better or graduate standing.
<table>
<thead>
<tr>
<th></th>
<th>Major Topics Covered in the Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction to networking concepts: computer networks and the internet, overview of OSI reference model, overview of TCP and UDP, hosts, ports, sockets and datagram’s, client/server architecture {3 classes}</td>
</tr>
<tr>
<td>2.</td>
<td>Java review: review of object-oriented programming concepts, objects, classes and interfaces in Java, applications vs. applets, programming with Java class libraries {5 classes}</td>
</tr>
<tr>
<td>3.</td>
<td>Stream based I/O in Java: overview of I/O streams, Java’s stream classes, object serialization exception handling {5 classes}</td>
</tr>
<tr>
<td>4.</td>
<td>Network programming in Java: the java.net package, sockets, data grams, URLs, introduction to Java security model, introduction to threads and concurrent servers {5 classes}</td>
</tr>
<tr>
<td>5.</td>
<td>Introduction to distributed computing: distributed systems, multi-tier architectures, basic RPC mechanisms, distributed objects {5 classes}</td>
</tr>
<tr>
<td>6.</td>
<td>Distributed computing with Java RMI: remote interfaces, objects and methods, passing object arguments via serialization, generating stubs and skeletons, registering remote objects, locating and using remote objects {5 classes}</td>
</tr>
<tr>
<td>7.</td>
<td>Java database connectivity: structured query language, transaction processing {4 classes}</td>
</tr>
<tr>
<td>8.</td>
<td>Java-based mobile agents: software agent technology, agent platforms {5 classes}</td>
</tr>
<tr>
<td>9.</td>
<td>Server-side programming: servlets and java server pages {3 classes}</td>
</tr>
</tbody>
</table>

NOTE: When course is taken as 500-level credit (CS 591 “Special Topics”), there will be additional requirements such as a research project.