



**CTS 4935C    Networking Capstone**

**Course Description:** This upper division course, for students majoring in the BS-IST Networking track, requires students to demonstrate their competence to analyze, design, develop, and test an information system in a team environment. Each team will create and present an information technology (IT) solution proposal that includes: design documentation, implementation plan, and project test plan to create an operational information system. Students will also implement a proof-of-concept in a real or simulated/virtualized environment. Prerequisite(s): Student must be classified as a Senior and have completed at least 3 of the 5 concentration courses to obtain departmental approval. (3-hour lecture, 2-hour lab)

Course Competency	Learning Outcomes
<p><b>Competency 1:</b> The student will successfully formulate project requirements and a statement of work by:</p>	<ul style="list-style-type: none"> <li>● Communication</li> <li>● Critical thinking</li> <li>● Information Literacy</li> <li>● Computer / Technology Usage</li> <li>● Numbers / Data</li> </ul>
<ol style="list-style-type: none"> <li>1. Defining the project purpose and the scope of work to be conducted.</li> <li>2. Describing the client’s business context.</li> <li>3. Determining the client’s needs, requirements, and compliance issues.</li> <li>4. Determining the client’s business goals in terms of performance, scalability, availability, security, and manageability.</li> <li>5. Using diagrams to describe the existing facilities and the existing network.</li> <li>6. Reviewing bandwidth requirements based on current and projected server processor volume.</li> </ol>	
<p><b>Competency 2:</b> The student will be able to design a solution to satisfy project requirements by:</p>	<ul style="list-style-type: none"> <li>● Critical thinking</li> <li>● Computer / Technology Usage</li> </ul>

<ol style="list-style-type: none"> <li>1. Assessing current network models and strategies to determine the optimal network design.</li> <li>2. Developing the network design using available network planning diagram tools, such as Cisco's Network Planning Solution (NPS).</li> <li>3. Designing a switching infrastructure that adheres to the established requirements, including segmentation requirements.</li> <li>4. Designing the Internet Protocol (IP) addressing and routing schemes that adhere to the established requirements.</li> <li>5. Examining the types of remote connectivity options commonly used to access WAN technologies.</li> <li>6. Examining the design and use of converged networks carrying data, VoIP (Voice over IP), and video traffic.</li> <li>7. Examining methods of enabling and supporting wireless portable and mobile devices in the enterprise.</li> <li>8. Examining virtualized resources and network storage capacity in the enterprise network.</li> <li>9. Designing security solutions for servers, computers, users and other accounts, routers, switches, and other network devices in an enterprise network using best practices.</li> </ol>	
<p><b>Competency 3:</b> The student will be able to specify a solution to satisfy project requirements by:</p>	<ul style="list-style-type: none"> <li>• Critical thinking</li> <li>• Computer / Technology Usage</li> </ul>
<ol style="list-style-type: none"> <li>1. Listing the physical hardware needed for the network, including servers, workstations, racks, printers, routers, switches, wireless access devices and other network infrastructure equipment.</li> <li>2. Setting up a scalable network cabling plan.</li> <li>3. Selecting the network services and protocols to be used.</li> <li>4. Describing the WAN technologies, including Virtual Private Network (VPN) solutions.</li> <li>5. Selecting space requirements, power, HVAC and cabling needs for the network.</li> </ol>	

<p><b>Competency 4:</b> The student will be able to implement a proof-of-concept in a virtualized/simulated environment by:</p>	<ul style="list-style-type: none"> <li>• Critical thinking</li> <li>• Computer / Technology Usage</li> </ul>
<ol style="list-style-type: none"> <li>1. Using a network simulation tool (GNS3, Packet Tracer, etc.) and/or actual networking devices.</li> <li>2. Configuring IP addresses and network protocols for computers, servers, switches, routers, default gateways, and other network devices.</li> <li>3. Troubleshooting connectivity errors.</li> <li>4. Configuring, establishing, documenting, and managing enterprise network connections to WANs.</li> <li>5. Implementing security controls such as Firewalls, Access Control Lists (ACL), Mandatory Access Control (MAC) or Discretionary Access Control (DAC) to ensure user policies are enabled.</li> <li>6. Determining volume, bandwidth, and placement requirements necessary for a functional wireless network.</li> <li>7. Testing the network using tools such as ping and traceroute.</li> </ol>	
<p><b>Competency 5:</b> The student will demonstrate the ability to effectively communicate and present the results of the project by:</p>	
<ol style="list-style-type: none"> <li>1. Developing presentations that are polished, informative, and engaging.</li> <li>2. Demonstrating that all work products provided the right level and type of detail.</li> <li>3. Satisfactorily answering questions ranging from implementation detail to test methodology to future evolution of project.</li> </ol>	

