

**COURSE ELT3350: NETWORK MANAGEMENT****Level:** Advanced**Theme:** Computer Networking Systems**Prerequisite:** ELT2310: Network Structures, ELT2320: Network Media & Devices, ELT2330: OSI Model (Open System Interconnection), ELT2340: Network Protocols, ELT2350: Local Area Networks**Description:** Students acquire knowledge of internal and external risks to a network and develop strategies for protecting network data and securing a network. They also develop and apply a general strategy for troubleshooting network problems and acquire knowledge of the basic roles and responsibilities associated with network maintenance and support.**Parameters:** Designed to be delivered in conjunction with other advanced level courses in the Computer Networking Systems theme. Schools have the option of delivering courses within this theme in conjunction with one or more Project courses from the Career Transitions theme if they wish to extend learning and/or address other vendor-specific technologies.

Access to a computer work centre equipped with networking hardware, software, tools and consumable supplies, and to instruction from an individual with specialized knowledge and skills in computer networking.

Particular emphasis is placed on risks and problems most common to a small network, and on the ability to apply troubleshooting strategies, tools and commands in specific situations. Students model and assume personal responsibility for ethical behaviour in their use of networking technologies and in their access to electronic sources of information. They also demonstrate an understanding of industry-based policies regarding network use and security.

**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>provide a rationale for protecting network data, and describe major components of a data backup strategy</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a test, presentation or project designed to address the following topics: <ul style="list-style-type: none"> <li>a rationale for protecting data in a LAN that addresses the nature, scope and source of potential risks</li> <li>major components of a data backup strategy</li> <li>the design of an appropriate data backup strategy, given a small office or home office network scenario</li> </ul> </li> </ul>	20

**COURSE ELT3350: NETWORK MANAGEMENT** (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• analyze security risks in a local area network (LAN), and describe steps that can be taken to secure a network</li> <li>• demonstrate an understanding of the functions and key roles of network maintenance and support in an organization</li> <li>• use appropriate strategies, tools and commands to troubleshoot common network problems</li> <li>• identify and describe career paths and employment opportunities in network maintenance and support</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• a test, presentation or project designed to address the following topics:               <ul style="list-style-type: none"> <li>– a rationale for network security that addresses the nature, scope and source of internal and external security risks</li> <li>– the characteristics of threats imposed by viruses, worms and Trojan horses, and through direct attack</li> <li>– strategies for protecting a LAN from internal and external risks</li> <li>– the design of an appropriate security plan</li> </ul> </li> <li>• a presentation or project designed to outline considerations, tasks and actions that are required to maintain and support an operating network; the presentation or project should address key functions and roles related to but not limited to:               <ul style="list-style-type: none"> <li>– network maintenance policies</li> <li>– network documentation</li> <li>– vendor upgrades</li> <li>– system backup</li> </ul> </li> <li>• a series of projects in which the student:               <ul style="list-style-type: none"> <li>– describes common sources of network problems in a LAN</li> <li>– demonstrates the safe use of troubleshooting tools</li> <li>– demonstrates ability to use appropriate software commands to check configuration or connectivity</li> <li>– demonstrates how packet sniffing software is used to capture and analyze data packets and frames</li> <li>– outlines a general strategy for troubleshooting network problems</li> <li>– uses appropriate strategies, tools and commands to troubleshoot common network problems</li> </ul> </li> <li>• a project or report identifying technical and professional career paths and employment opportunities in network administration, maintenance and support, and related education and certification requirements. The student should also refine a portfolio and résumé suitable to present qualifications for a selected entry-level networking position</li> </ul>	<p>15</p> <p>25</p> <p>25</p> <p>10</p>



**COURSE ELT3350: NETWORK MANAGEMENT** (continued)

Concept	Specific Outcomes	Notes
Network Security	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• give reasons for network security</li> <li>• describe the nature, scope and source of internal and external security risks in a LAN environment</li> <li>• identify the characteristics of threats imposed by:               <ul style="list-style-type: none"> <li>– viruses, worms and Trojan horses</li> <li>– direct attack; e.g.:                   <ul style="list-style-type: none"> <li>• eavesdropping</li> <li>• password attacks</li> <li>• Internet Protocol (IP) address spoofing</li> </ul> </li> </ul> </li> <li>• identify and describe strategies for protecting a LAN from internal and external risks; i.e.:               <ul style="list-style-type: none"> <li>– user authentication, access permissions and account options</li> <li>– share permissions and user group access rights</li> <li>– virus protection</li> <li>– firewalls</li> <li>– data encryption</li> </ul> </li> <li>• design an appropriate security plan, given a small office or home office network scenario.</li> </ul>	<p>Network security involves the protection of network resources from attacks that originate both inside and outside the network. The first line of defence for network security is user authentication. Firewalls are hardware and software devices that can control the flow of data packets between an internal network and an external network such as the Internet.</p> <p>A network security plan should identify possible security risks to the network and methods that will be used to minimize security risks.</p>
Network Troubleshooting	<ul style="list-style-type: none"> <li>• describe the most common sources of network problems in a LAN; e.g.:               <ul style="list-style-type: none"> <li>– user error</li> <li>– software</li> <li>– physical connectivity</li> </ul> </li> <li>• demonstrate the safe use of troubleshooting tools; e.g.:               <ul style="list-style-type: none"> <li>– cable tester</li> <li>– crossover cable</li> <li>– digital voltmeter</li> <li>– protocol analyzer</li> <li>– tone generator/tone locator</li> </ul> </li> <li>• demonstrate the use of appropriate software commands to check configuration or connectivity; e.g.:               <ul style="list-style-type: none"> <li>– IPCONFIG</li> <li>– PING</li> <li>– TRACERT</li> </ul> </li> </ul>	<p>Compare proactive and reactive approaches to network troubleshooting.</p> <p>Interpret visual indicators (e.g., link lights, collision lights) to determine the nature of a network problem.</p> <p>Demonstrate the use of network monitoring software and protocol analyzers.</p>

**COURSE ELT3350: NETWORK MANAGEMENT** (continued)

Concept	Specific Outcomes	Notes
<p>Network Troubleshooting (continued)</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• outline a general strategy for troubleshooting network problems; e.g.:               <ul style="list-style-type: none"> <li>– establish the symptoms</li> <li>– identify the affected area</li> <li>– establish what has changed</li> <li>– select the most probable cause</li> <li>– implement a solution</li> <li>– test the results</li> <li>– recognize the potential effects of the solution</li> <li>– document the solution</li> </ul> </li> <li>• use appropriate strategies, tools and commands, given a small office or home office network scenario, to troubleshoot common network problems related to:               <ul style="list-style-type: none"> <li>– a particular physical topology</li> <li>– client connectivity</li> <li>– wiring and/or infrastructure</li> <li>– remote connectivity.</li> </ul> </li> </ul>	<p>Effective troubleshooting requires:</p> <ul style="list-style-type: none"> <li>• accurate documentation</li> <li>• a systematic approach</li> <li>• working from the basic to the complex.</li> </ul>
<p>Network Maintenance and Support</p>	<ul style="list-style-type: none"> <li>• outline considerations that are required to maintain and support an operating network; e.g.:               <ul style="list-style-type: none"> <li>– anticipated activities</li> <li>– data integrity</li> <li>– hardware and software standards</li> <li>– repair policies</li> <li>– system monitoring</li> <li>– training</li> </ul> </li> <li>• identify benefits associated with network maintenance and support</li> <li>• identify and describe key functions and roles related to network maintenance and support activities; e.g.:               <ul style="list-style-type: none"> <li>– network maintenance policies</li> <li>– network documentation</li> <li>– vendor upgrades</li> <li>– system backup</li> </ul> </li> <li>• identify hardware devices/software tools used to gather information to assist network maintenance and support activities</li> <li>• develop a plan to maintain and support an operating network.</li> </ul>	<p>Network maintenance should occur as a result of a planned, documented and structured process.</p> <p>Discuss major criteria and benefits associated with network maintenance and support.</p>

**COURSE ELT3350: NETWORK MANAGEMENT** (continued)

Concept	Specific Outcomes	Notes
Career Paths	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• identify technical and professional career paths and employment opportunities in network administration, maintenance and/or support</li> <li>• place network administration, maintenance and/or support job titles in a progression sequence</li> <li>• write a detailed network administration, maintenance and/or support position description</li> <li>• describe related post-secondary and/or industry education/certification requirements and opportunities</li> <li>• organize/refine a portfolio and résumé suitable to present qualifications for a selected entry-level networking position.</li> </ul>	<p>Plan for individual/group research and presentations that address:</p> <ul style="list-style-type: none"> <li>• job description</li> <li>• employment market</li> <li>• education/training</li> <li>• salary range.</li> </ul> <p>Research and describe available industry networking certification tracks.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews</li> <li>• work study/experience</li> <li>• job shadowing.</li> </ul>