COURSE INFORMATION

COURSE TITLE
CNG104: Intro to TCP/IP

COURSE DESCRIPTION
Covers the basic elements of the Transmission Control Protocol and the Internet Protocol, the basic technologies that implement the Internet and computer networking. In addition to TCP and IP the course covers networking media, link layer, network layer, and transport layer protocols. Also included are routing, broadcast, multicast, and network address translation. IP version 4 and IP version 6 are both covered.

CREDIT HOURS
This course carries 3 semester credits. You can normally expect to put in 8-10 hours per week on this course.

SUGGESTED PREREQUISITE KNOWLEDGE
(CNG101 or CNT200) is the prerequisite for this course. The instructor will assume that you have computer literacy. This literacy includes your ability use computer terminology, your ability to navigate the internet, your ability to use Microsoft Office, including the drawing tools, your ability to install software, and your ability to communicate effectively in English.

CCCOOnline Course Policies

The CCCOnline Course Policies page contains information about the student's role in the classroom, grading policies, and rights and responsibilities.
COURSE MATERIALS

Your textbook is available online as an eText. You do not need to purchase any additional materials. For specific information on refund policies and the optional black and white textbook available for purchase please contact the CCCOnline bookstore.

MINIMUM COMPUTER REQUIREMENTS

To complete this course, you will need regular access to a computer from which you can get to the internet and use email. In order to ensure that your course functions properly, you must run the System Check. This is a CRITICAL STEP, and taking the time to do it now will eliminate a tremendous amount of frustration for you later. To run the System Check, click Tools in the course NavBar and then click System Check.

REQUIRED eText

MAIN eText


TEXTBOOK WEBSITE

This course uses Cengage Mindtap which contains the eText in addition to interactive media content to help you remember what you learn.

• Visit the Cengage Course Start page for details on first access of the materials.

To make sure your computer is set up correctly to access the eText and other digital content, review the Cengage Technical Support page, also linked in the Technical Support Module.
STUDENT COMPETENCIES

The competencies you will demonstrate in this course are as follows:

A. Identify and describe the seven layers of the OSI model.
B. Describe the different types of media used in networking.
C. Describe the addressing schemes for IPv4 and IPv6.
D. Describe the processes implemented at the Data Link Layer.
E. Identify the different Network layers protocols.
F. Identify the different Transport layer protocols.
G. Contrast and compare different routing protocols.
H. Explain different network management protocols.
I. Describe the purpose and implementation of network address translation.
J. Explain and implement the process of subnetting.

The module outcomes that will permit you to demonstrate course competencies are:

MODULE 1

Outcomes
1. Describe how TCP/IP is fundamental to the OSI mode and other networking architectures.
2. Identify the different network management protocols.
3. Reproduce and implement the process of subnetting.
5. Describe IP addressing, anatomy and structures, and addresses from a computer’s point of view.
6. Identify and describe the various IP address classes from A to E, and explain how they’re composed and used.
7. Define the terms subnet and supernet, and apply their knowledge of how subnets and supernets work to solve specific network design problems.
8. Identify how public and private Internet addresses are assigned, how to obtain them, and how to use them properly.

MODULE 2

Outcomes
1. Identify the various purpose and fields that make up an IPv4 and IPv6 header.
2. Describe how MTU Discovery works in IPv6 and how it replaces fragmentation of IPv4 packets by routers.
3. Describe how upper-layer checksums work in IPv6 packets, including the use of pseudo-headers.
4. Define the primary differences between IPv4 and IPv6 packet structures and why the differences are significant.
5. Define the fundamental concepts associated with Data Link layer protocols that operate over different network link types.
6. Label the different types of packets used on IP networks.
7. Describe how hardware address resolution occurs for IPv4 and IPv6 with ARP and Neighbor Discovery Protocol protocols.
8. Describe detailed information about IPv4 and IPv6 routing protocols.
### Module 3

**Outcomes**
1. Define the basics of the Internet Control Message Protocol (ICMP).
2. State a basic overview of the ICMPv6 protocol.
3. Describe the intricacies of all the different ICMPv6 informational messages.
4. Describe how PMTU has been changed for IPv6.
5. Describe the basic services that DHCP/DHCPv6 offers to its clients and explain its background.
7. Describe broadcast and unicast addressing for IPv4 as well as multicast addressing for IPv6.
8. State the basic DHCP/DHCPv6 packet structure and types of DHCP/DHCPv6 messages in use.

**Competencies**
- H
- H
- H
- C
- C
- C
- C

### Module 4

**Outcomes**
1. Describe the characteristics of the various name resolution protocols, such as DNS and LLMNR.
2. State how name resolution works in IPv4 networks.
3. Describe how name resolution works on IPv6 networks.
4. Describe the common sources for name resolution failure and use.
5. State the key features and functions of the User Datagram Protocol and the Transmission Control Protocol.
6. Explain in detail the header fields and functions of the UDP packet, as well as port numbers, processes, and how UDP behaves when used as a transport protocol by IPv6.
7. Explain in detail the mechanisms that drive segmentation, reassembly, and retransmission for TCP as well as how TCP behaves when used as a transport protocol by IPv6.
8. Explain the differences between connectionless and connection-oriented transport mechanisms.

**Competencies**
- C
- C
- C
- C
- C
- C

### Module 5

**Outcomes**
1. State IPv6 deployment requirements and considerations.
2. Outline an IPv6 deployment.
3. Outline IPv6 deployment by IPv6 test/pilot network, migrate applications, upgrade IPv4-only hosts to IPv4/IPv6, and tunnelled IPv6 environment using 6to4, Teredo, or ISATAP.
4. Define basic concepts and principles for maintaining computer and network security.
5. Describe the anatomy of an IP attack.
6. Identify common points of attack inherent to TCP/IP architecture.
7. State the importance of honeypots and honeynets for network security.

**Competencies**
- B, C
- B, C
- B, C
- B, C
- B, C
- B, C
- B, C
Grading and Evaluation

Methods

Evaluation includes a combination of discussion participation, assignments, and other evaluations. Rubrics are provided for assignments and discussions.

Grading Policies

Mark all Module due dates on your calendar for this class. You may submit assignments AHEAD of schedule. Late assignments will not be accepted without prior approval.

SUMMARY OF GRADING

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussions (10 @ 30 points each)</td>
<td>300</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes (12 @ 10 points each)</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Case Studies (10 @ 30 points each)</td>
<td>300</td>
<td>30%</td>
</tr>
<tr>
<td>Labs (10 @ 30 points each)</td>
<td>300</td>
<td>30%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1000</td>
<td>100%</td>
</tr>
</tbody>
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Grading Scale

A = 90 to 100%  B = 80 to 89%  C = 70 to 79%  D = 60 to 69%  F = 59% and below

Discussions

The discussion will consist of three or more posts. The first one will be based off of one or more topics and will consists of 1-2 paragraphs. You will then need to post two different type of replies.

Reply 1: Additional Research and Innovation

The purpose of your first reply is to verify and expand the topic. As with all ideas, they can always be improved on or added. You need to find two ways to improve the discussion topic. You will need to add two additional resources to the topic.

Reply 2: Analysis

The purpose of the 2nd reply is to critically analysis the topic being discussed. This is to be done professionally. You need to find one potential flaw, security concern, or issue that might be a risk to a company, school, home, or any other entity that uses the internet. Please include at least one source of reference that backs your reply.
CASE PROJECTS

Each chapter will consist of 1 or more Case Projects. You will be assigned one of the Case Projects at the end of each Chapter to explore, research, and provide a solution.

Make sure you include header information: Name, Class, Topic Name

Present a 1-2 page solution to the Case Project. Feel free to include a diagram, illustration or picture that supports your solution. Include your references, the first being the class course book and at least one other resource.

Your solution should be formatted and easily readable. Make sure you present the case project (the problem), anything the audience should know and your solution (research). Your solution should present your ideas, and how it overcomes the problem.

LABS

Each module represents a list of hands-on activities/projects. This will allow you to see, experiment, and participate in the implementation of the topics being discussed.

QUIZZES

As with any educational environment, you will need to prove that you understand the concepts and principles addressed in this module.

Note: Quizzes for this course are set to at least 10 times. You may continually take them until you get the scores you are happy with. Any Capstone or Exams in the class are set to twice if applicable.
COURSE SCHEDULE

The Schedule is subject to change as needed.

This page summarizes all of the graded assignments, exams, and reading assignments for the course. If you want, you can print it out and post it somewhere handy.

All assignments are described in detail on the Module assignment pages. If you have questions check there and/or send me an e-mail.

This course is not self-paced and is not open-exit. All assignments, papers, quizzes, discussions, etc., are to be completed by no later than 11:59 pm MST/MDT of the due date.

NOTE: Important CCCOnline semester dates (e.g., drop/withdraw/term end) appear on the CCCOnline calendar.