

IT 280 Study Guide
Winter 2015

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Study Guide

This is the **Official Study Guide** for the IT 280, Computer Networking, taught by Don Colton, Winter 2015.

This study guide is focused directly on “what” and “when.” It talks about the description and grading of the exams and labs. It tells what is required for each one.

<http://byuh.doncolton.com/it280/2151/sguide.pdf> has the latest version of this study guide. **It will be updated throughout the semester**, as new assignments are made, and as due dates are established, and as clarifications are developed.

Syllabus

<http://byuh.doncolton.com/it280/2151/syl.pdf> is the official syllabus for this course. It is largely reproduced in Chapter 2 (page 6) below.

Text Book

This study guide is a companion to the text book for the class.

The textbook tells “why” and “how.” Its role is explaining things and telling how to make things work.

The textbook is “Networking 101: An Introduction To Networking,” by Don Colton. It is available in PDF form, free.

Free textbook (short URL):

<http://n101.tk/>

Alternate URL for textbook:

<http://n101.doncolton.com/>

The textbook is 99% stable, but new material is occasionally added and chapter numbering may even change. It has a good index.



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Chapter 1

Introduction

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1.1 Sending Me Email

These rules apply to all emails related to this class.

Rule One: Send emails to **doncolton2@gmail.com**

Rule Two: Put **it280** in your email subject line.

Rule Three: Single-topic emails get answered faster than multi-topic emails do. Avoid combining several topics in a single email.

I must confess, I sometimes get buried in email. I do not want to overlook your email to me, or have it end up caught in my spam filter. And for my own sanity I want to be able to find and deal with all the email related to this class at the same time. This is especially true for large classes.

My solution is to have you put **it280** (exactly, with no spaces in it) in your email subject line, preferably as the first word. If you do this, my email system will immediately and automatically respond to you, telling you that I got your email and it is in my queue.

If you fail to do this, you will not get an immediate reply and your email will end up in some other queue in my work flow. Your email will not be noticed when I am grading for this class. In the best case I will read your

email and ask you to send it again with the correct word in the subject line. In the worst case your email will be in my spam folder and I will never even see it.

Chapter 2

Syllabus Extracts

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The syllabus is intended to be stable and reliable. I publish the syllabus at the start of the semester, and then I do not make any substantial changes in it except in case of extreme emergency.

The study guide, on the other hand, gets changed and updated throughout the semester.

This chapter of the study guide simply repeats, for your convenience, material given in the syllabus. In case it differs from the syllabus, the syllabus itself is always correct and authoritative, and this study guide is probably out of date.

2.1 Overview

It is hard to imagine a world without the Internet. Networking has made the sharing of information much faster than it was before. We get emails and instant messages with pictures attached instead of waiting days for postal delivery. We register “online” for classes instead of waiting “in line” to pull computer cards. We buy worldwide from Amazon or eBay or locally from Craig’s List instead of visiting our local bricks-and-mortar store. We research on Google instead of at the library.

People love being connected. But sometimes networks break. The world needs workers with technical skills. This course is focused on those skills: creating the wiring, connecting the computers, and making networks.

This course is an introductory course that will prepare you to understand, set up, and operate your own home network, or small business, or maybe even Internet Café. You will understand the fundamentals of networking and what technical things are necessary for success with those activities.

This course lays the foundation to prepare you to take other courses in the IT major, such as:

IT 426, Computer Network Services: Installation, configuration, and management of network services such as file servers and directory services with an emphasis on Microsoft Windows.

IT 480, Computer Network Design: Networking of computers and configuration of managed networking equipment including switches and routers, with special emphasis on Cisco equipment and protocols.

IT 481, Information Assurance and Security: Introduction to information security providing a foundation of computer security concepts, including general security, communication security, infrastructure security, basics of cryptography, and operational and organizational security.

2.1.1 Expected Proficiencies

As you begin this course, we assume you have no special networking experience whatsoever. We expect you can read, type, send and receive email, and visit web sites. We will teach you everything else you need to know.

Ideally you will have your own personal computer, probably a laptop. You will probably also have a Wi-Fi enabled device such as a smart phone.

2.2 Course and Faculty

2.2.1 Course Information

- **Title:** Computer Networking
- **Course Number:** IT 280
- **Course Description:** (from the catalog) End-user fundamentals in-

cluding local area networks, home networks, wireless networks, routers, firewalls, ports, address sharing, dynamic host configuration, OSI model, IPv4, netmasks, subnets, and troubleshooting.

- **Prerequisites:** none
- **Semester/Year:** Winter 2015
- **Semester Code:** 2151
- **Meeting Time:** MWF 09:50 to 10:50
- **Location:** GCB 111
- **First Day of Instruction:** Mon, Jan 12
- **Last Day to Withdraw:** Tue, Mar 10
- **Last Day of Instruction:** Mon, Apr 13
- **Final Exam:** Fri, Apr 17, 10:00 to 12:50

2.2.2 Faculty Information

- **Instructor:** Don Colton
- **Office Location:** GCB 128
- **Office Hours:** MWF 14:30-15:00, TuTh 15:30-16:00.
- **Email:** doncolton2@gmail.com
- **Campus Homepage:**
<http://byuh.doncolton.com/> is my campus homepage. It has my calendar and links to the homepages for each of my classes.
- **Off-Campus Homepage:**
<http://doncolton.com/> is my off-campus homepage.

I have reserved GCB 111 on MWF from 14:30 to 15:30 (right after my CIS 101 class) and on TuTh from 15:30 to 17:00 (right after my IT 240 class) so my students (and others) can study in a lab setting and meet with me and each other. I will be there at the start of those hours, and will stay as long as students are asking me questions. I also allow the room as an Open Lab for your use either individually or in groups, for my class or for other classes.

2.2.3 Course Readings and Materials

- **Textbook:**
<http://n101.tk/> Networking 101, An Introduction To Networking, covering Internet Basics, Home Networks, Wi-Fi, Security, and IPv4. By Don Colton.

- **Learning Management System:**
<https://dcquiz.byuh.edu/> is the learning management system for my courses.
- **Course Homepage:**
<http://byuh.doncolton.com/it280/> is my course homepage. It has links to many things including the syllabus, study guide, and textbook.
- **Study Guide:**
<http://byuh.doncolton.com/it280/2151/sguide.pdf> is the study guide for this course. It is fairly well indexed and includes a copy of much of this syllabus. The study guide is updated frequently throughout the semester as assignments are made and deadlines are established or updated.

2.3 Calendar

Items marked with T: are tests. The notation T:ch1518 means it is a chapter test that covers chapters 15 through 18. The notation T:SN means it is a skills test that covers the SN content area. The notation u3 (for example) means that the material is part of Unit 3.

Mon Jan 12 First Day of Instruction
 Wed Jan 14 u1 T:ch01
 Fri Jan 16 u1 T:ch0203
 Mon Jan 19 No Class: Human Rights Day
 Wed Jan 21 u1 T:ch0405
 Fri Jan 23 L1 Ethernet Cables (u3 ch15)
 Mon Jan 26 u2 T:ch06
 Wed Jan 28 u2 SN Lecture (ch08)
 Fri Jan 30 u2 T:ch0911
 Mon Feb 02 u2 T:SN (ch08)
 Wed Feb 04 u3 T:ch12
 Fri Feb 06 u3 T:ch13
 Mon Feb 09 u3 L2 Dia Network Diagram
 Wed Feb 11 u3 T:ch14
 Fri Feb 13 u3 T:ch1518
 Mon Feb 16 No Class: Presidents' Day
 Wed Feb 18 u3 L3 Router Configuration (ch13)
 Fri Feb 20 u3 L3 Router Configuration (ch13)

Mon Feb 23 u4 T:ch19
 Wed Feb 25 u4 T:ch20
 Fri Feb 27 Midterm 1 Retakes u1-u3
 Mon Mar 02 u5 T:ch21, discuss L4
 Wed Mar 04 u5 T:ch23
 Fri Mar 06 u5 T:ch24
 Mon Mar 09 u5 T:ch25
 Tue Mar 10 Last Day To Withdraw
 Wed Mar 11 u5 T:ch26
 Fri Mar 13 u6 SS Lecture (ch28)
 Mon Mar 16 u6 SS Lecture (ch28)
 Wed Mar 18 u6 SV Lecture (ch29)
 Thu Mar 19 No Class: Empower Your Dreams
 Fri Mar 20 u6 T:SS T:SV (ch2829)
 Mon Mar 23 u6 T:ch27
 Wed Mar 25 u6 T:ch2830
 Thu Mar 26 No Class: Kuhio Day
 Fri Mar 27 TBA
 Mon Mar 30 u7 T:ch31
 Wed Apr 01 u7 T:ch32
 Fri Apr 03 u7 T:ch33
 Mon Apr 06 Midterm 2 Retakes (u4-u6)
 Wed Apr 08 TBA
 Fri Apr 10 TBA
 Mon Apr 13 TBA, Last day for late labs
 Fri Apr 17 Final, 10:00 to 12:50, GCB 111

We meet 38 times plus the final exam.

Midterm and Final dates are firm and will not change unless there is an emergency. All tests are closed-book, closed-notes, closed-neighbor, etc. You can bring blank paper.

Other daily topics are flexible, and may be adjusted according to the pace at which students are learning. The due date and deadline for activities will be published in the study guide and mentioned in class. The study guide will be updated as needed throughout the semester.

2.4 Grading

I use a 60/70/80/90 model based on 1000 points.

Based on 1000 points

930+	A	900+	A-	870+	B+
830+	B	800+	B-	770+	C+
730+	C	700+	C-	670+	D+
630+	D	600+	D-	0+	F

The 1000 points are divided up as follows.

- Attendance 38 points.
- Chapter Tests 622 points.
- Skills Tests 180 points.
- Labs 160 points.

2.4.1 IT 280 Grade Books

In my Learning Management System (DCQuiz), I keep several online grade books so you can see how your points are coming along. This lets you compare yourself with other students in the class (without seeing their names).

2151 IT 280 Overall Grade Book: This includes the totals from all the other grade books. This is where you can find your final grade at the end of the course.

2151 IT 280 (whatever) Grade Book shows your points in the (whatever) category. (whatever) is Chapter or Attendance.

2.4.2 Attendance (38 points)

Each day in class starts with the “daily update” (DU). It is my way of reminding you of due dates and deadlines, sharing updates and news, and taking roll. It is your way of saying something anonymously to each other and to me. It must be taken in class at a classroom computer during a window of time that starts a few minutes before class and ends 5 minutes into class.

Attendance Policy: You must attend to complete the Daily Update and thereby earn the Attendance points. You must attend to take the Chapter Tests and thereby earn the Chapter Test points. You must attend to take the Skills Tests and thereby earn the Skills Test points. Besides that, there is no penalty for being late or lack of attendance. It is possible to earn the Lab points without attending.

2151 IT 280 Attendance Grade Book shows your attendance points, one point per day, for 38 days. You get one point for each time you do the daily update. If you arrive too late to complete the daily update, you will not receive the attendance point for that day.

Tardiness: My tardiness policy is that you should arrive in time to complete the daily update. Generally if you are less than four minutes late, you will have time to complete the daily update before the deadline.

2.4.3 Tests

All tests, quizzes, and exams are closed-book, closed-notes, closed-neighbor, etc. You can bring blank paper. **Some memorization is required.**

We have chapter tests, skills tests, midterms, and a final exam.

The midterms and final each consist of an opportunity to retake some or all of the chapter tests and skills tests previously given. If you are already satisfied with your scores, you can skip class or leave early.

Each midterm exam covers a group of chapter tests.

The Final Exam time is Fri, Apr 17, 10:00 to 12:50. The final covers all chapter tests and all skills tests.

2.4.4 Chapter Tests (622 points)

The current plan is for 21 chapter tests. Each covers one or more chapters in the text book.

There are assigned readings. These are listed in the course calendar. Right after prayer on most days (not exam days), there will be a short test (about ten minutes) based on the assigned readings. It will consist of about 25 questions (but could be more or less).

Chapter tests are labeled in the calendar with ch followed by two or four

digits. The first two digits identify the first chapter being tested, and the last two digits identify the last chapter being tested. Thus, ch0203 covers the questions from chapter 2 through chapter 3.

The chapter tests are mostly about knowing answers to common questions, and involve memorizing facts and terminology.

For each chapter test you have several opportunities. Each test has a day on which it is given in class, right after the opening prayer. On that first day, any score you earn is granted a 10% bonus. It probably has a midterm day when makeup tests are given. And it has the day when the final exam is scheduled. There may be other opportunities, but that is not guaranteed. You can take each test as many times as it is offered. We will keep your highest score.

Typically each test question is worth two “chapter test” points, which is about 1.4 overall points. The total number of chapter test points is about 866, but it could end up being more or less. We will mathematically scale those points to be 622 overall points toward the final grade.

The chapter tests are “closed book,” by which I mean that you are not allowed to look up answers while you are taking the test.

Your scores from these Chapter Tests will be recorded in **2151 IT 280 Chapter Grade Book**. The total from this grade book will be rescaled so the full-credit values add up to 622 points.

2.4.5 Three Skills Tests (180 pts)

SN: (60 pts) q25 Skill with Numbers. 40 questions.

SS: (60 pts) q50 Skill with Subnets. 40 questions.

SV: (60 pts) q51 VLSM Subnets. About 10 questions.

These skills-based exams are based on skills taught in the book and in class. Practice tests are available after each test has been introduced, or by request.

Retakes: You can retake skills tests on any retake day, and your highest score will be kept.

2.4.6 Four Labs (160 pts)

L1: (40 pts) Lab 1: Ethernet Cables

L2: (40 pts) Lab 2: Dia Network Diagram

L3: (40 pts) Lab 3: Router Configuration

L4: (40 pts) Lab 4: Password Report

2.4.7 Other Extra Credit

Extra credit is available for reporting an error in my formal communications (the published materials I provide), so I can fix it. In this class, the materials include the following:

- The course website, parts relating to this semester.
- The course syllabus.
- The course study guide.
- The course textbook, since I wrote it.

Each error reported can earn you extra credit. (Typos in my email messages are all too common and do not count.)

Syllabus errors (unless they are major) will probably be fixed only in the study guide. Check there before reporting it.

2.5 Instructional Methods

Tests (chapter tests and skills tests) happen on most days. They are typically short. Tests are an instructional method that brings you, the student, face to face with information you should know and challenges you should be able to solve.

Lecture happens as a side-effect of the grading of the chapter tests. This happens immediately after the test ends. I openly grade and discuss the answers that were submitted to help you learn.

Some days I may spend the whole class period lecturing about a current topic, and there is no test that day. I review material that was assigned from the text book and do what I can to make it clear and interesting. These can take up most of the class hour, and happen more often at the start of the course than they do later on.

Activity days present a lab situation where we work to create something.

2.5.1 BYUH Learning Framework

I agree with the BYUH Framework for Learning. If we follow it, class will be better for everyone.

2.5.2 Prepare for IT 280

Prepare: Before class, study the course material and develop a solid understanding of it. Try to construct an understanding of the big picture and how each of the ideas and concepts relate to each other. Where appropriate use study groups to improve your and others' understanding of the material.

In IT 280: Do the readings for each chapter before the chapter test. There is more than we could cover in class because we all learn at different rates. Our in-class time is better spent doing activities and answering your questions than listening to me lecture.

2.5.3 Engage in IT 280

Engage: When attending class actively participate in discussions and ask questions. Test your ideas out with others and be open to their ideas and insights as well. As you leave class ask yourself, "Was class better because I was there today?"

In IT 280: Participate in the in-class activities. Those that finish first are encouraged to help those that want assistance. It is amazing what you can learn by trying to help someone else.

2.5.4 Improve at IT 280

Improve: Reflect on learning experiences and allow them to shape you into a more complete person: be willing to change your position or perspective on a certain subject. Take new risks and seek further opportunities to learn.

In IT 280: After each exam, I usually allow you to see every score and every comment and every answer submitted for every question. To improve your understanding, review your answers and those of other students. See

how your answers could be improved. If you feel lost, study the assigned readings again and ask questions.

2.5.5 Support

The major forms of support are (a) open lab, (b) study groups, and (c) tutoring.

If you still need help, please find me, even outside my posted office hours.

2.5.6 Office Hour / Open Lab

As noted above, I have reserved GCB 111 on MWF from 14:30 to 15:30 (right after my CIS 101 class) and on TuTh from 15:30 to 17:00 (right after my IT 240 class) so my students (and others) can study in a lab setting and meet with me and each other. I will be there at the start of those hours, and will stay as long as students are asking me questions. I also allow the room as an Open Lab for your use either individually or in groups, for my class or for other classes.

2.5.7 Study Groups

You are encouraged to form a study group. If you are smart, being in a study group will give you the opportunity to assist others. By assisting others you will be exposed to ideas and approaches (and errors) that you might never have considered on your own. You will benefit.

If you are struggling, being in a study group will give you the opportunity to ask questions from someone that remembers what it is like to be totally new at this subject. They are more likely to understand your questions because they sat through the same classes you did, took the same tests as you did, and probably thought about the same questions that you did.

Most of us are smart some of the time, and struggling some of the time. Study groups are good.

2.5.8 Tutoring

The CIS department provides tutoring in GCB 111, Monday through Friday, typically starting around 5 PM and ending around 11 PM (but earlier on Fridays). Normally a schedule is posted on one of the doors of GCB 111.

Tutors can be identified by the red vests they wear when they are on duty.

There are networking-savvy student workers in GCB 119. They are not dedicated tutors like the 111 tutors. Instead, they work on building the CIS network and maintaining the CIS labs. But they are sometimes available to answer questions.

If you still need help, please come and see me, even outside my posted office hours.

2.6 Course Policies

Subject to Change: Like all courses I teach, I will be keeping an eye out for ways this one could be improved. Changes generally take the form of opportunities for extra credit, so nobody gets hurt and some people may be helped. If I make a change to the course and it seems unfair to you, let me know and I will try to correct it. If you still think it is unfair, you can appeal to the department chair (Stuart Wolthuis) or the dean (Jim Lee). Also, you are welcome to suggest ways you think the class could be improved.

Digital Recording by me: I may digitally record the audio of my lectures some days. This is to help me improve my teaching materials.

Digital Recording by you: Almost everyone has a smart phone these days. I assume students will freely record what goes on in class, and take pictures of what is on the white board, to aid in their studies. I simply ask that you not embarrass anyone.

2.6.1 Special Treatment

There are many good reasons why students request special treatment. These include, for example, illness, field trips, performances, athletic events, and special needs. Instead of dealing with these as they arise, based on my past experience, I have adopted general policies that are intended to accommodate all but the most difficult cases, and thereby avoid the need for special

treatment.

2.6.2 Reasonable Accommodation

This section covers special needs, including qualified special needs, as well as all other requests for special treatment.

I have carefully designed each of my classes to provide what I believe to be reasonable accommodation to those with special needs. Beyond that, further accommodation is usually considered to be unreasonable but may happen in extreme cases. Please see the paragraph on “Accommodating Special Needs” below for more information.

Ample Time: Specifically, I allow ample time on tests so that a well-prepared student can typically finish each test in half of the time allowed. This gives everyone essentially double the amount of time that should normally be needed.

Exam Retakes: Each exam is given three times (sometimes more), and I keep the highest score that was earned. This handles the case of persons that are unable to attend class or function at their best on any given day.

I consider the first attempt to be routine. The first time the exam is given, a bonus of 10% is added to your score. This is to encourage you to prepare well for the exam.

I consider the second and third attempts to be an accommodation for anyone that might need it. The scheduled final exam is Fri, Apr 17, 10:00 to 12:50. The final consists of that third opportunity to retake **any** exam that was offered during the semester. If you are happy enough with your previous scores, **you can probably skip the final.**

As a side effect of this three-tries approach to exams, it is also true that any student can miss any one or two days of class for any reason without messing up their grade.

On the other hand, the retakes are limited. If you have issues every single time the test is given, I do draw the line, and I will not give additional chances. Additional retakes are not considered to be a “reasonable” accommodation. Additional retakes or make-ups are not offered except in highly unusual circumstances.

Extra Credit: I have built some extra credit into the grading so you can miss a few points here or there and make them up elsewhere.

Deadlines: Most labs are due very soon after they are discussed, but I normally allow late work at full credit for another week.

Even though I truly believe that these methods provide reasonable accommodation for almost everyone in almost every case, you might have a highly unusual situation for which I can and should do even more. You are welcome to see me about your situation.

2.6.3 Communication

We communicate with each other both formally and informally.

Formal communication is official, carefully worded, and normally in writing. Formal is for anything truly important, like grades.

Informal communication is casual and impromptu. It is meant to be helpful and efficient. Reminders are informal. Emails are informal. Explanations are usually informal.

From Me to You, Formal

I communicate formally, in writing, through (a) the syllabus, (b) the study guide, and (c) the learning management system.

(a) Syllabus: <http://byuh.doncolton.com/it280/2151/syl.pdf> is the syllabus for this course. It tells our learning objectives and how you will be graded overall. You can rely on the syllabus. After class begins, it is almost never changed except to fix major errors.

(b) Study Guide: <http://byuh.doncolton.com/it280/2151/sguide.pdf> is the study guide for this course. It includes a copy of the syllabus. The study guide is updated frequently throughout the semester, as assignments are made and deadlines are established or updated.

(b1) Calendar: The study guide tells when things will happen. It contains specific due dates.

(b2) Assignments: The study guide tells what assignments have been made and how you will be graded, item by item. It provides current details and specific helps for each assignment. It provides guidance for taking the exams.

(c) **DCQuiz:** <https://dcquiz.byuh.edu/> is my learning management system. I use it to give tests. I use it to show you my grade books.

From Me to You, Informal

My main informal channels to you are (a) word of mouth and (b) email.

(a) **Word of Mouth, including Lecture:** Class time is meant to be informative and helpful. But if I say anything truly crucial, I will also put it into the study guide.

(b) **Email:** My emails to you are meant to be helpful. But if I say anything truly crucial, I will also put it into the study guide. Normally I put IT 280 at the front of the subject line in each email I send.

From You to Me, Formal

Your formal channels to me, specifically how you turn in class work, are mainly via (a) the learning management system, (b) email, and (c) specifically requested projects.

(a) **DCQuiz:** To use my learning management system, you must log into it. Then, you can respond to questions I have posted. Each day there will be a “daily update”. I say more on that below. Exams will also be given using DCQuiz.

(b) **Email:** You will use formal email messages to submit some of the programs you write and to tell me certain other things. The study guide tells how to send formal emails, including where to send them, what subject line to use, and what to put in the body of the message.

(c) **Student Projects:** The study guide may tell you to submit certain work in the form of a webpage or web-based program. If so, it will say specifically where to put it. I will go to that spot to grade it.

From You to Me, Informal

Your informal channels to me, typically how you ask questions and get assistance, are mainly face to face and by email or chat.

Face to Face: If you need help with your class work, I am happy to look at it and offer assistance. Often this happens during class or during office

hours. Often I will have you put your work on your computer screen, and then I will take a look at it while we talk face to face.

Email / Chat: You can also get assistance by sending me an email or doing a chat. I will do my best to respond to it in a reasonable and helpful way. If you want something formal, use the formal rules.

If you are writing about several different things you will usually get a faster response if you break it up into several smaller emails instead of one big email. I try to respond to a whole email at once, and not just part of it. I usually answer smaller and simpler emails faster than big ones.

2.7 Learning Outcomes

Outcomes (sometimes called objectives) are stated at several levels: Institutional (ILO), Program (PLO), and Course (CLO). In this section we set forward these outcomes and tell how they are aligned with one another.

2.7.1 ILOs: Institutional Outcomes

ILO: Institutional Learning Outcomes (ILOs) summarize the goals and outcomes for all graduates of BYUH.

Brigham Young University Institutional Learning Objectives (ILOs) Revised
24 February 2014

Graduates of Brigham Young University–Hawai‘i will:

Knowledge: Have a breadth of knowledge typically gained through general education and religious educations, and will have a depth of knowledge in their particular discipline.

Inquiry: Demonstrate information literacy and critical thinking to understand, use, and evaluate evidence and sources.

Analysis: Use critical thinking to analyze arguments, solve problems, and reason quantitatively.

Communication: Communicate effectively in both written and oral form, with integrity, good logic, and appropriate evidence.

Integrity: Integrate spiritual and secular learning and behave ethically.

Stewardship: Use knowledge, reasoning, and research to take responsibility.

ity for and make wise decisions about the use of resources.

Service: Use knowledge, reasoning, and research to solve problems and serve others.

2.7.2 PLOs: Program Outcomes

PLO: Program Learning Outcomes (PLOs) summarize the goals and outcomes for graduates in programs for which this course is a requirement or an elective. These support the ILOs, but are more specific.

At the end of this section, we include the relevant page from the CIS Program Outcomes Matrix, dated April 2011.

The following outcomes are pursued at the levels indicated.

Medium: **Practiced with Feedback**

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

Medium: **Practiced with Feedback**

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Medium: **Practiced with Feedback**

(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

Medium: **Practiced with Feedback**

(e) An understanding of professional, ethical, legal, security and social issues and responsibilities.

Medium: **Practiced with Feedback**

(f) An ability to communicate effectively with a range of audiences.

Low: **Introduced**

(h) Recognition of the need for and an ability to engage in continuing professional development.

Medium: **Practiced with Feedback**

(i) An ability to use current techniques, skills, and tools necessary for computing practice.

Medium: **Practiced with Feedback**

(IT j) An ability to use and apply current technical concepts and practices

in the core information technologies.

Low: Introduced

(IT k) An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.

Low: Introduced

(IT l) An ability to effectively integrate IT-based solutions into the user environment.

2.7.3 CLOs: Course Outcomes

CLO: Course Learning Outcomes (CLOs, also called Student Learning Outcomes, or SLOs) summarize the goals and outcomes for students who successfully complete this course. These support the PLOs, but are more specific.

Course Goals and Student Learning Outcomes are as follows:

By the conclusion of this course, students will do the following:

Internet: Explain how the Internet works. This includes topics such as connecting to the Internet, using the domain name system and using dynamic host configuration.

Home Networking: Properly set up a home network. List and explain the different objects, media, and devices used in a home network that is connected to the Internet through an ISP. Design, install, configure, and manage a simple LAN, install services, and connect the LAN to the Internet.

Wireless Networking: Design, install, configure, and manage a simple wireless LAN. This includes channel selection, WEP/WPA, SSID, and antenna considerations.

Security: Explain what security typically exists and how to get more. Includes password selection, firewalls, and issues with opening up ports for gaming.

Theory: Explain the following basic concepts: OSI 7-layer stack, protocol data units (packets, frames, etc.), udp, tcp, arp, and ports.

IPv4 Addressing: Explain network masks, subnetting, address classes, private IP addresses, MAC addresses, collision domains, broadcast domains, and what a LAN is.

Power Tools: Demonstrate the use of common network applications and utilities including ping, traceroute, ipconfig, dig, nmap, ssh, telnet, ftp, and Wireshark.

2.8 General Topics

All syllabi are encouraged or required to address certain topics. These are generally considered to be common sense, but we find that it is useful to mention them explicitly anyway.

2.8.1 Academic Integrity

Applicable Actions

<http://honorcode.byuh.edu/> details the university honor code. In the section entitled “Applicable Actions” the following are listed.

Examples of possible actions include but are not limited to the following, for instructors, programs, departments, and colleges:

- Reprimanding the student orally or in writing.
- Requiring work affected by the academic dishonesty to be redone.
- Administering a lower or failing grade on the affected assignment, test, or course.
- Removing the student from the course.
- Recommending probation, suspension, or dismissal.

Depending on the specifics of the offense, any of these responses may be possible.

Cheating on exams is the most common form of dishonesty that I normally encounter. Normally this happens when students bring in notes that include answers to past exam questions. I approve the studying of past exams, and bringing in of “memories” based on study, but not the access to written notes, including notes retrieved from other exams or stored on cell phones or other devices. Any such activity, if caught, can result in failure of the entire course.

Cheating on activities is almost impossible to detect because I allow students to collaborate and assist each other. Copy and paste is not allowed, but it is difficult to detect and prove, so I normally do not bother. You should try to understand the work you submit because it helps you prepare for the exams and future courses.

Plagiarism

We learn by watching others and then doing something similar.

Plagiarism: Sometimes it is said that plagiarism is copying from one person, and research is “copying” from lots of people.

When you are having trouble with an assignment, I encourage you to look at not just one, but many examples of work done by others. Study the examples. See what you can learn from them. Do not automatically trust that they are right. They may be wrong.

<http://en.wikipedia.org/wiki/Plagiarism> has a wonderful article on plagiarism. Read it if you are not familiar with the term. Essentially, plagiarism is when you present the intellectual work of other people as though it were your own. This may happen by cut-and-paste from a website, or by group work on homework. In some cases, plagiarism may also create a violation of copyright law. If you borrow wording from someone else, identify the source.

Intentional plagiarism is a form of intellectual theft that violates widely recognized principles of academic integrity as well as the Honor Code. Such plagiarism may subject the student to appropriate disciplinary action administered through the university Honor Code Office, in addition to academic sanctions that may be applied by an instructor.

Inadvertent plagiarism, whereas not in violation of the Honor Code, is nevertheless a form of intellectual carelessness that is unacceptable in the academic community. Plagiarism of any kind is completely contrary to the established practices of higher education, where all members of the university are expected to acknowledge the original intellectual work of others that is included in one’s own work.

IT 280: On exams you are required to work from personal memory, using only the resources that are normally present on your computer. This means the exams are closed book and closed notes.

Faculty are responsible to establish and communicate to students their expectations of behavior with respect to academic honesty and student conduct in the course. Observations and reports of academic dishonesty shall be investigated by the instructor, who will determine and take appropriate action, and report to the Honor Code Office the final disposition of any incident of academic dishonesty by completing an Academic Dishonesty Student Violation Report. If the incident of academic dishonesty involves the vio-

lation of a public law, e.g., breaking and entering into an office or stealing an examination, the act should also be reported to University Police. If an affected student disagrees with the determination or action and is unable to resolve the matter to the mutual satisfaction of the student and the instructor, the student may have the matter reviewed through the university's grievance process.

2.8.2 Sexual Misconduct

Sexual Harassment is unwelcome speech or conduct of a sexual nature and includes unwelcome sexual advances, requests for sexual favors, and other verbal, nonverbal, or physical conduct. Conduct is unwelcome if the individual toward whom it is directed did not request or invite it and regarded the conduct as undesirable or offensive.

Brigham Young University–Hawai'i is committed to a policy of nondiscrimination on the basis of race, color, sex (including pregnancy), religion, national origin, ancestry, age, disability, genetic information, or veteran status in admissions, employment, or in any of its educational programs or activities.

University policy and Title IX of the Education Amendments of 1972 prohibits sexual harassment and other forms of sex discrimination against any participant in an educational program or activity at BYUH, including student-to-student sexual harassment.

The following individual has been designated to handle reports of sexual harassment and other inquiries regarding BYUH compliance with Title IX:

Debbie Hippolite-Wright
Title IX Coordinator
Vice President, Student Development & Life
Lorenzo Snow Administration Building
55-220 Kulanui Street
Laie, Hawaii 96762
Office Phone: 808-675-4819
E-Mail: debbie.hippolite.wright@byuh.edu
Sexual Harassment Hotline: 808-780-8875

BYUH's Office of Honor upholds a standard which states that parties can only engage in sexual activity freely within the legal bonds of marriage be-

tween a man and a woman. Consensual sexual activity outside the bonds of marriage is against the Honor Code and may result in probation, suspension, or dismissal from the University.

2.8.3 Dress and Grooming Standards

The dress and grooming of both men and women should always be modest, neat and clean, consistent with the dignity adherent to representing The Church of Jesus Christ of Latter-day Saints and any of its institutions of higher learning. Modesty and cleanliness are important values that reflect personal dignity and integrity, through which students, staff, and faculty represent the principles and standards of the Church. Members of the BYUH community commit themselves to observe these standards, which reflect the direction given by the Board of Trustees and the Church publication, “For the Strength of Youth.” The Dress and Grooming Standards are as follows:

Men. A clean and neat appearance should be maintained. Shorts must cover the knee. Hair should be clean and neat, avoiding extreme styles or colors, and trimmed above the collar leaving the ear uncovered. Sideburns should not extend below the earlobe. If worn, moustaches should be neatly trimmed and may not extend beyond or below the corners of mouth. Men are expected to be clean shaven and beards are not acceptable. (If you have an exception, notify the instructor.) Earrings and other body piercing are not acceptable. For safety, footwear must be worn in all public places.

Women. A modest, clean and neat appearance should be maintained. Clothing is inappropriate when it is sleeveless, strapless, backless, or revealing, has slits above the knee, or is form fitting. Dresses, skirts, and shorts must cover the knee. Hairstyles should be clean and neat, avoiding extremes in styles and color. Excessive ear piercing and all other body piercing are not appropriate. For safety, footwear must be worn in all public places.

2.8.4 Accommodating Special Needs

Brigham Young University–Hawai‘i is committed to providing a working and learning atmosphere, which reasonably accommodates qualified persons with disabilities. If you have a disability and need accommodations, you may wish to self-identify by contacting:

Services for Students with Special Needs

McKay 181

Phone: 808-675-3518 or 808-675-3999

Email address: aunal@byuh.edu

The Coordinator for Students with Special Needs is Leilani A‘una.

Students with disabilities who are registered with the Special Needs Services should schedule an appointment with the instructor to discuss accommodations. If the student does not initiate this meeting, it is assumed no accommodations or modifications will be necessary to meet the requirements of this course. After registering with Services for Students with Special Needs, and with permission of the student, Letters of Accommodation will be sent to instructors.

If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Human Resource Services at 808-780-8875.

2.9 Syllabus Summary

Brigham Young University–Hawai‘i has adopted certain requirements relating to the information that must be provided in syllabi. This section lists those requirements and for each item either provides the information directly or gives a link to where it is provided above.

Course Information: See section [2.2.1](#) (page 8).

Title: Computer Networking

Number: IT 280

Semester/Year: Winter 2015

Credits: 3

Prerequisites: none

Location: GCB 111

Meeting Time: MWF 09:50 to 10:50

Faculty Information: See section [2.2.2](#) (page 9).

Name: Don Colton

Office Location: GCB 128

Office Hours: MWF 14:30-15:00, TuTh 15:30-16:00.

Telephone: 808-675-3478

Email: doncolton2@gmail.com

Course Readings/Materials: See section [2.2.3](#) (page 9) for a list of textbooks, supplementary readings, and supplies required.

Course Description: See section [2.2.1](#) (page 8).

Expected Proficiencies:

See section [2.1.1](#) (page 8) for the proficiencies you should have before undertaking the course.

Course Goals and Student Learning Outcomes, including Alignment to Program (PLOs) and Institutional (ILOs) Learning Outcomes, and extent of coverage.

See section [2.7](#) (page 22) for learning outcomes, showing the content of the course and how it fits into the broader curriculum. A listing of the

departmental learning outcomes is provided together with the ratings taken from department's matrix assessment document representing the degree to which the course addresses each outcome.

Instructional Methods: See section 2.5 (page 15).

Learning Management System:

<https://dcquiz.byuh.edu/> is the learning management system for my courses.

Framework for Student Learning:

See section 2.5.1 (page 16) for a discussion of the student learning framework and how I use it.

Course Calendar: See section 2.3 (page 10) for the calendar in general.

Here are some items of particular interest:

First Day of Instruction: Mon, Jan 12

Last Day to Withdraw: Tue, Mar 10

Last Day of Instruction: Mon, Apr 13

Final Exam: Fri, Apr 17, 10:00 to 12:50

Final Exam Location: GCB 111

Course Policies: See section 2.6 (page 18).

Attendance: See section 2.4.2 (page 13).

Tardiness: See section 2.4.2 (page 13).

Class Participation: See section 2.5.3 (page 16).

Make-Up Exams: See section 2.6.2 (page 19).

Plagiarism: See section 2.8.1 (page 28).

Academic Integrity: See section 2.8.1 (page 27).

Evaluation (Grading): See section 2.4 (page 12).

Academic Honesty: See section 2.8.1 (page 27).

Sexual Harassment and Misconduct: See section 2.8.2 (page 29).

Grievances: The university grievance policy states that the policies listed on the syllabus can act as a contract and will be considered if a student complains about the faculty.

Services for Students with Special Needs: See section [2.8.4](#) (page 30).

Chapter 3

Task ch01, etc. Chapter Tests

These tests cover the readings in the text book. They are mostly about knowing answers to common questions, and involve memorizing facts and terminology.

In most cases, each question on the chapter tests is worth two points. The grand total of all points on the chapter tests is about 866. However, the chapter tests count for only 622 points out of 1000 on your semester grade. We convert between chapter test points and semester points by dividing by 866 and then multiplying by 622. Each chapter test point is worth about 0.7 semester points.

ch01: (38 pts)

- 2015-01-14 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch0203: (32 pts)

- 2015-01-16 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch0405: (30 pts)

- 2015-01-21 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch06: (124 pts)

- 2015-01-26 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch0911: (50 pts)

- 2015-01-30 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch12: (50 pts)

- 2015-02-04 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch13: (48 pts)

- 2015-02-06 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch14: (22 pts)

- 2015-02-11 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch1518: (30 pts)

- 2015-02-13 10:00:00 to 10:10:01 (10% bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch19: (36 pts)

- 2015-02-23 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch20: (30 pts)

- 2015-02-25 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch21: (18 pts)

- 2015-03-02 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch23: (44 pts)

- 2015-03-04 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch24: (32 pts)

- 2015-03-06 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch25: (30 pts)

- 2015-03-09 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch26: (58 pts)

- 2015-03-11 10:00:00 to 10:10:01 (10% bonus)

- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch27: (68 pts)

- 2015-03-23 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch2830: (36 pts)

- 2015-03-25 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch31: (40 pts)

- 2015-03-30 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch32: (38 pts)

- 2015-04-01 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

ch33: (12 pts)

- 2015-04-03 10:00:00 to 10:10:01 (10% bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

Chapter 4

Task SN Skill with Numbers

This exam contains 40 questions and normally takes about 30 minutes to complete. You can take it several times. We will keep your highest score. It is offered on the following dates.

- 2015-02-02 10:00:00 to 10:50:01 (no bonus)
- 2015-02-27 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

Networking uses several different number bases, with the most important one being binary.

There is a practice test. The official exam consists of 40 questions. The practice test has more questions. As you answer each question, it will tell you whether you got the answer right or not, and will let you try again until you do get it right.

To study for this test, use the Networking 101 textbook. The training for this is currently in Chapter 8, Converting Between Bases, that starts on about page 50.

Future changes to the textbook may cause this to move, but if so you can look in the textbook index for “convert”. You will find the following entries:

- convert binary to decimal

- convert binary to hex
- convert binary to octal
- convert decimal to binary
- convert hex to binary
- convert octal to binary

20 Easier Questions

There are 5 questions that ask you to convert a number from binary into base 8 (octal).

There are 5 questions that ask you to convert a number from base 8 (octal) into binary.

There are 5 questions that ask you to convert a number from binary into base 16 (hexadecimal, or hex).

There are 5 questions that ask you to convert a number from base 16 (hex) into binary.

20 Harder Questions

There are 10 questions that ask you to convert a number from binary into base 10 (decimal).

There are 10 questions that ask you to convert a number from base 10 (decimal) into binary.

Chapter 5

Task SS

Skill with Subnets

This exam contains 40 questions and normally takes about 20 minutes to complete. You can take it several times. We will keep your highest score. It is offered on the following dates.

- 2015-03-20 10:00:00 to 10:50:01 (no bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

Networking uses IP addresses. The currently prevailing scheme is called IPv4, and divides the IP address into two parts: the network address and the host address. Subnetting divides the IP address into three parts: the network, the subnet, and the host.

There is a practice test. The official exam consists of 40 questions. The practice test has more questions. As you answer each question, it will tell you whether you got the answer right or not, and will let you try again until you do get it right.

Chapter 6

Task SV

Skill with VLSM

This exam contains about 10 questions and normally takes about 10 minutes to complete. Two or more versions are offered so if you fail one you can try again immediately. It is offered on the following dates.

- 2015-03-20 10:00:00 to 10:50:01 (no bonus)
- 2015-04-06 10:00:00 to 10:50:01 (no bonus)
- 2015-04-17 10:02:00 to 12:50:01 (no bonus)

For this test, to get credit you must get a perfect score. That is because the questions are closely related to one another, and your answer on each question will affect the overall correctness of your proposed solution.

There are several practice tests so you can try again and again until you get it perfect.

IPv4 addresses are a scarce commodity. Subnets are a method to get the most value out of the IPv4 addresses that are available.

Each subnet contains a number of addresses, and that number is a power of two. The powers of two are: 1, 2, 4, 8, 16, 32, 64, 128, 256, and so on.

The subnets must be packed together carefully. Specifically, they must start on a boundary that is a multiple of their own size. For example, a 32-address subnet must start of a boundary that is a multiple of 32. And they must not overlap with each other. This is best achieved by placing the largest subnets first and the smaller ones later.

You will be given a set of networks and a space into which they must be packed. For each network, you will be told how many hosts are in the network. You must decide how big the network must be to fit that many hosts. To do this, you add two and round up to a power of two. Then you must place the network into the space provided so that nothing overlaps.

This test is worth 50 points. To earn those points, you must provide a correct solution to the complete problem. This is an all-or-nothing situation. If you make any errors you will not get credit, but you will be able to try again up until the end of the final. There may be a limit to how many times you can try this test per day.

Chapter 7

Task L1

Ethernet Cable

- Status: Officially Assigned.
- Discussed: Fri, Jan 23.
- 40pt Deadline: Mon, 2015-01-26, 15:30.
- 30pt Deadline: Fri, 2015-02-06, 15:30.
- Grading Label: **L1**

Summary: Construct a working and beautiful cat5 cable.

Deadlines: If you complete this task by the 40pt deadline, you will receive 40 points toward your final grade. If not, but you complete it by the 30pt deadline, you will receive 30 points toward your final grade. If not, you receive no points.

Chapter 15 of the textbook provides background.

Beautiful means that the cable ends are neat. Specifically, the wire extends about 1/2 inch beyond the sheath, and is completely within the ice cube.

I will provide 8P8C (RJ45) ice cubes, cable, a cutter-crimper, and a cable tester. Most people complete the task in class within an hour, but some do not. You are allowed to borrow the equipment, take it home, and return it later.

Chapter 8

Task L2

Dia - Network Diagramming

- Status: Officially Assigned.
- Discussed: Mon, Feb 09.
- 40pt Deadline: Mon, 2015-02-09, 23:59.
- 30pt Deadline: Mon, 2015-02-16, 23:59.
- Grading Label: **L2**

Submit By Email: This task must be submitted to me by email. The general rules for email are in section [1.1](#) (page 4). The email subject line must be:

```
it280 L2 lastname, firstname
```

Purpose: To give you a way to create a network diagram.

Summary: Using the network described below, construct a one-page diagram. Email a PDF of your diagram to me.

Deadlines: If you complete this task by the 40pt deadline, you will receive 40 points toward your final grade. If not, but you complete it by the 30pt deadline, you will receive 30 points toward your final grade. If not, you receive no points.

You are supporting 4 routers and 7 work groups.

Router r1 connects to: r3 r4.

Router r2 connects to: r4.

Router r3 connects to: r1.

Router r4 connects to: r1 r2.

Work group Hanoi has 15 users and connects to router r3.

Work group Istanbul has 15 users and connects to router r4.

Work group London has 3 users and connects to router r4.

Work group Moscow has 3 users and connects to router r3.

Work group PortMoresby has 15 users and connects to router r2.

Work group Wellington has 31 users and connects to router r4.

Work group Yokohama has 20 users and connects to router r2.

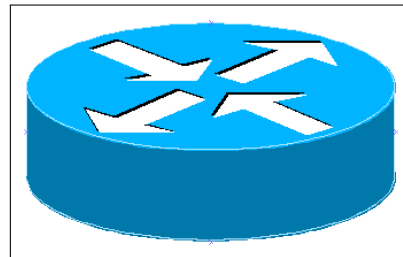
We will use the Dia Diagram Editor. It is similar to Microsoft Visio. Dia is available free for Mac, Windows, and Linux (including Ubuntu).

Google search “dia diagram editor tutorial” for instructions, or watch and learn in class.

General Requirements:

- email subject line must be: `it280 L2 lastname, firstname`
- diagram must include it280
- diagram must include L2
- diagram must include your Lastname and Firstname
- diagram must include today’s date
- diagram must use the proper symbols

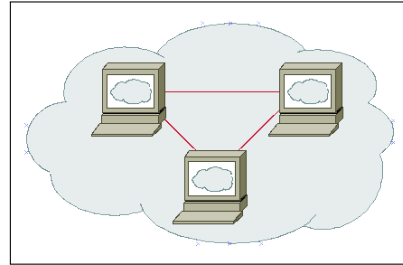
Use this symbol for each router. You can find it on the “Cisco - Switch” symbol sheet. Put a text label on each router that tells its designated name.



Use this symbol for each switch. (Put a switch between each router and its work-group.) You can find it on the “Cisco - Switch” symbol sheet.



Use this symbol for each workgroup. You can find it on the “Cisco - Computer” symbol sheet. Put a text label on each workgroup that tells its designated name (location) and group size.



Connect the symbols with lines that indicate their wiring relationship to one another. Do not use arrow heads on your lines.

Chapter 9

Task L3

Router Configuration

- Status: Officially Assigned.
- Discussed: Wed, Feb 18.
- 40pt Deadline: Mon, 2015-02-23, 15:30.
- 30pt Deadline: Mon, 2015-03-02, 15:30.
- Grading Label: **L3**

Summary: Configure a typical home router.

Deadlines: If you complete this task by the 40pt deadline, you will receive 40 points toward your final grade. If not, but you complete it by the 30pt deadline, you will receive 30 points toward your final grade. If not, you receive no points.

9.1 BEFW11S4 Router

We will be using the Linksys BEFW11S4 home router.

<http://support.linksys.com/en-us/support/routers/BEFW11S4> has documentation.

9.2 Wiring

Our first task is to insert the router between our ISP (the school) and our lab computer. Before we do this, we must make sure the lab computer is properly logged in.

Set the router on your desktop. Plug it into its power supply.

Find the cable from the ISP (the school) to your lab computer.

(ISP) –old-cable– (Lab Computer)

Unplug the cable from the computer and plug it into the Internet port on the router. This port is sometimes labeled WAN (Wide Area Network) or Uplink.

(ISP) –old-cable– (Router) (nothing) (Lab Computer)

Next, run a cable from one of the four downlink ports (labeled 1, 2, 3, 4) on the router, right back into the network port on the lab computer.

(ISP) –old-cable– (Router) –new-cable– (Lab Computer)

When we are done, we will return the wiring to its original configuration.

9.3 Reset The Router

Unless you know the router’s administrative password, it will be necessary to reset the router. This gets rid of any passwords and other settings that others may have established. It gives us a clean slate to work with.

Find the red button on the back of the router. It is recessed slightly. Use a pencil or pen (or some other appropriate tool) to hold down the reset button for about ten seconds.

While you are holding down the reset button, if possible, watch the lights on the front of the router. After about ten seconds they will flicker once or twice. This is a signal to you that the reset has been accomplished. If you cannot watch the lights, just hold the reset for a few more seconds to increase your chances of success.

If you are working with a different router, and the reset method is not obvious, do a Google search for “(router model) reset” for advice.

9.4 Find Your Gateway's IP Address

On the lab computer, run the `ipconfig` command. You are looking for the IP address of your gateway. If you did a reset, it will be:

192.168.1.1

If you are using a different router, similar rules apply.

9.5 Browse to the Gateway

The gateway is running its own mini-webserver. This webserver gives you the way to manage the configuration of the router.

On your lab computer, open a browser. In the URL space, type in the IP address of the gateway.

The router will respond by requiring you to authenticate (log in). For the BEFW11S4 router, the username and password are as follows:

Username: (just leave this blank)

Password: admin

If you are working with a different router, and you do not know the default password of that router, do a Google search for “(router model) default password” for advice.

9.6 Establish A New Password

Select the Administrative tab. You should see a way to key in a new administrative password. Do it. This will keep others from changing your configurations and taking control of your router.

After saving your new password, the router will require you to log in again because your old password is no longer correct.

9.7 Explore The Settings

You can look ahead to the graded task (the last section of this chapter) to see what things will be required of you.

You should explore the settings available to you through the web interface to the router. See if you can figure out what they do. Ask questions in class about the configuration options.

9.8 MAC Address Cloning

Some ISPs will tie a connection to a specific MAC address. If you want to change computers, you would need to wait for the old MAC address to expire. This can take several minutes (or possibly much longer).

To avoid this problem, many routers provide the ability to clone the MAC address of the computer you are using, and then present that MAC address when talking to the ISP.

You may be required to do this. Even if you are not required, it does not hurt, and is probably a good idea.

9.9 Use The Internet

The purpose of being connected is to use the Internet. Make sure the lab computer can browse the Internet. You already know it can reach the router. Going beyond the router will prove that the router is working.

9.10 Establish A Wi-Fi Hotspot

Create a suitable password for your Wi-Fi access point. It will probably need to be at least eight characters long.

Create a suitable SSID (Service Set Identifier) for your Wi-Fi access point. It can be up to 32 characters long.

9.11 The Graded Task

You will be working with the teaching assistants in GCB 119. They will have posted hours on their door. Check in GCB 119 for the correct times.

Print out the next page, write your name on the sheet, and take it to the teaching assistants.

The TA will fill in the other top blanks of the sheet. Then they will give you a router to work with and a place to work.

Complete the activities on the sheet and have the TA check your work. They should sign the sheet.

Bring the sheet to me so I can record your credit.

9.12 Allowable Helps

As you are graded on this lab, you will be working alone, without assistance of other students, and without consulting the Internet.

You are allowed to bring one page of personally hand-written notes. (Written by you yourself. Not printed. Not photocopied.)

Besides your notes you should have no other helps.

1 Teaching Assistant Selections

Use the BEFW11S4 router provided by Bro Colton via the TA.

The teaching assistant (TA) should randomly select values for the following items. Write the values selected in the blanks below.

- (1) _____ Specify a LAN network number (third quad) between 2 and 255.
- (2) _____ Specify the Router Inside IP Address (last quad) between 2 and 99.
- (3) _____ Specify an Administrative Password to be used.
- (4) _____ Specify a Wi-Fi Password to be used (8+ chars).
- (5) _____ Specify a Wi-Fi SSID to be used.
- (6) _____ Specify a Wi-Fi Channel (1-11) to be used. (Not 6.)

2 Router Configuration

Use a laptop provided by the student, or a computer provided by the TA. The student demonstrates each item to the TA, or the TA verifies the item. The TA should initial the blank at the start of the line. When all items are verified, the TA should sign below. Where (1) through (6) are mentioned, replace them by the values specified above.

_____ (1a) Reset the router. Prove that this was done by showing the router configuration.

Call for the TA to verify the item above.

_____ (2a) Set the router network to 192.168.(1).0.

_____ (2b) Set the router internal IP address to 192.168.(1).(2).

_____ (2c) Set the administrative password to the value (3) shown above.

_____ (2d) Set the Wi-Fi password to the value (4) shown above.

_____ (2e) Set the Wi-Fi SSID to the value (5) shown above.

_____ (2f) Set the Wi-Fi channel to the value (6) shown above.

_____ (2g) Activate Logging.

Call for the TA to verify the items above and below.

_____ (3a) Demonstrate that the laptop has an IP address issued by the router.

_____ (3b) Demonstrate that the laptop is connecting through the router to the Internet, and that several different web sites can be visited successfully.

_____ (3c) Demonstrate that Logging has occurred.

TA certifies that the lab was completed. Student or TA returns the form to the instructor.

_____ TA Signature

_____ TA Name

_____ Date

Chapter 10

Task L4 Password Report

- Status: Officially Assigned.
- Discussed: Mon, Mar 02.
- 40pt Deadline: Mon, 2015-03-09, 23:59.
- 30pt Deadline: Mon, 2015-03-16, 23:59.
- Grading Label: **L4**

Submit By Email: This task must be submitted to me by email. The general rules for email are in section [1.1](#) (page [4](#)). The email subject line must be:

```
it280 L4 lastname, firstname
```

This is a research paper. You will write about passwords.

Credit Deadlines: If you complete this task by the 40pt deadline, you will receive 40 points toward your final grade, and possibly extra credit. If not, but you complete it by the 30pt deadline, you will receive 30 points toward your final grade. If not, you receive no points.

Extra Credit: If you fulfill the requirements listed below, you will get full credit. If you go beyond the minimum requirements and impress me with your thought process and your writing, I will give extra credit depending on how impressed I am, up to 10 more points. Probably the top five papers will get extra credit, but I will not know until I see the papers.

Background: Passwords have long been used to authenticate users of com-

puter systems. They can represent a nice balance between convenience and security.

But are passwords falling out of favor?

Use the Internet to research the question of passwords. Tell the state of the art. What are the best practices? What is good? What is bad?

How long should passwords be? Is this a problem?

How often should passwords be changed? Is this a problem?

What about two-factor authentication? Who uses it? Why? How does it work?

What things are proposed to replace the use of passwords? Do you think they are realistic?

If you were setting up the password requirements for a website, what requirements would you think are reasonable? How many characters would you require? How many characters would you allow? How often would your require password changes? If you do 2FA, what kind would you use?

Please tell what other people advise (including conflicting advice) and why. Then tell what you believe at this time.

Requirements: Submit your lab as a PDF file, as an attachment to an email to me. (Do not submit a doc file or docx file.)

The title page should say “IT 280 Lab 4 Password Report Winter 2015” and should give your name. No other information is needed on that page.

Use headings in your paper to make it easy for me to find the answers to the main questions listed above, plus any other questions you thought were important.

If you include any direct quotation of words written by other people, mark them appropriately, like by using quote marks, and indicate the source. Words written by other people should be no more than ten percent of your report. Most or all of your report should be written in your own words. I want this to be your thoughts in reaction to what other people are saying and thinking.

Your Advice: Say what you believe to be the best way to deal with passwords. What policies do you think are best, and why.

Annotated Bibliography: At the end of your paper, list the websites or other sources that you used, and tell briefly what kinds of information you

got from each. This is called an annotated bibliography.

There is no particular number of pages required. It should be long enough to cover the subject.

Margins should be about an inch, more or less. I am not too picky.

Use Verdana, 11 point, for the body of your report. Verdana is widely available. If you have trouble finding it, check with me.

Appendix A

Appendix

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A.1 Reporting Spelling Errors

I offer extra credit for reports of spelling and grammar errors in my formal communications, by which I mean written materials like syllabi, study guides, and text books as well as current portions of webpages. This is very helpful to me in correcting spelling mistakes. And it sometimes gets my students to read my materials carefully.

How To Tell Me: To get this credit, send me an email with details of the error (or supposed error) that you have found.

What To Tell Me: Provide enough context that I can easily find the error. Maybe copy and paste the whole paragraph where the error is. I give less credit if you just send me the page number and the wrong word. It is too much like looking for a needle in a haystack. Give me context.

Using Tools: This has gotten to be sort of a game at times, which makes it fun. We can get into Grammar Nazi mode and be picky, picky, picky. Students will cut and paste my words into a document and then run a

spelling checker or grammar checker. Or they will directly open the PDF in a spelling or grammar checker.

Tools Break: You are welcome to use these tools, but you should be aware that spelling and grammar checkers work by a simplified set of rules compared to real life. If there are two spellings for a word, the spelling checker will commonly only accept one and will reject the other. This does not make the other wrong.

The truth about English, and probably all languages, is that language changes over time. New words are created. New spellings are accepted. New grammar happens. And old grammar is resurrected.

I generally follow the accepted practices as shown in style guides such as the Chicago Manual of Style. But I take exception to certain things like those that are noted below. For things that I have considered and listed below, even though they may show up with a checker, I do not consider them to be incorrect.

My rules are (a) is it commonly done? (b) is it ambiguous? (c) is it pretty? These are the same rules used by grammarians, but our decisions in any given case may be different.

Here is my list.

themselves - Modern usage has tended away from gender-specific words like himself in favor of gender-neutral words. I have migrated from him and her to “singular” **them** as my solution of choice to the gender-neutral dictates of modern political correctness. Some dictionaries do not recognize themselves as a word, and instead suggest themselves. For plural them, this would be correct, but for singular them, themselves is correct and is documented to have been used as far back in time as the 1400s.

vs - Should it have a dot? The usage argument is that in British writing, abbreviations are dotted when the final letters have been dropped, but not when the intermediate letters have been dropped. Versus removes intermediate letters. American usage may differ. I do not put a dot after it. I don't like how it looks with a dot. It is a conscious decision, not an error.

zeros - versus zeroes: Both are considered correct. Google says that zeros is more commonly used.

Ambiguous Plurals - The plural of 15 is 15s, not 15's. Using an apostrophe generally indicates possession, but people do commonly (and incorrectly) use an apostrophe for plurals when without it the meaning seems less clear. My

choice when making a plural that would look ambiguous is to quote the string being pluralized. So, for me, the plural of (a) is (“a”s) rather than (a’s) or (as).

Ambiguous Quoted Punctuation - When should punctuation that is not part of a quote be moved inside the quote marks? Typesetters traditionally float a period (full stop) inside a trailing quote mark because it looks better that way. In computing, quote marks typically delimit strings that have special meaning, and putting punctuation inside the marks changes the meaning of the string. I usually float punctuation if it does not change the meaning of the thing quoted. Otherwise not.

Series Comma - Some people write a list of three things as (a, b and c), but others write it as (a, b, and c). I write it the second way. This is not an error. Both usages are correct, but I find the first usage to be ambiguous, so I almost always use the second form.

A.2 Seeing Your Grade

<https://dcquiz.byuh.edu/> is where I maintain my online grade books.

There will be several grade books. One will have your overall grade. Another will have your effort points.

Each grade is identified by a short label.

A.3 Emailing Me

At times you may want to email me regarding this class, or I may ask you to email something to me.

If you follow these instructions, you will receive an instant reply letting you know that I received your email, and that I will respond to it.

Here are the rules.

To: Preferred destination is doncolton2@gmail.com but you could also use don.colton@byuh.edu. They both end up the same place.

Subject: The subject line is important.

For email in general, it looks like this:

it280 (normal subject line of your choice)

The it280 gets it past my spam filter and helps me organize my work flow. Trust me, some days I get a lot of email. I don't want yours to be lost or overlooked.

The (normal subject line of your choice) is whatever you want it to be.

For email I requested, it looks like this:

it280 (item) (lastname, firstname)

The (item) is usually a program identifier, or the words "study time" or "lab 4".

The (lastname, firstname) is the name by which you are known on my roll sheet. We will agree on that name early in the semester.

I often reply with "done" so you know I updated your study points.

Email is not 100% reliable. Maybe your email was lost. Maybe my reply was lost. If you do not receive the first reply almost instantly, it probably means I did not get it. Check your sent mail, fix if necessary, and try again. Do you have the correct email address for me? Did you put "it280" at the start of the subject line?

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