

# IT 280 – Computer Networking

## Course Syllabus and Calendar – Winter 2013

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Brigham Young University–Hawai‘i

### Contents

		5.3 Excused Absences . . . . . 6
<b>1</b>	<b>Overview</b>	<b>6</b>
1.1	Preparation . . . . .	6
1.2	There May Be Changes . . . . .	6
<b>2</b>	<b>Course Details</b>	<b>7</b>
2.1	About the Course . . . . .	7
2.2	My Websites . . . . .	7
2.3	About the Instructor . . . . .	7
2.4	Emailing Me . . . . .	7
<b>3</b>	<b>Learning Objectives</b>	<b>7</b>
<b>4</b>	<b>Grading</b>	<b>8</b>
4.1	Grading Scale . . . . .	8
4.2	Tracking Your Grade . . . . .	8
4.3	Effort: (50 pts) Daily Update . . . . .	8
4.4	Effort: (250 pts) Study Time . . . . .	8
4.5	Effort Points are Optional . . . . .	8
4.6	Skill: (400 pts) “E” Exams . . . . .	8
4.7	Skill: (140 pts) “S” Exams . . . . .	8
4.8	Skill: (160 pts) Labs . . . . .	8
4.9	Extra Credit Presentation . . . . .	8
4.10	Other Extra Credit . . . . .	8
<b>5</b>	<b>Calender</b>	<b>8</b>
5.1	Special Dates . . . . .	8
5.2	Day by Day . . . . .	8
<b>6</b>	<b>Support</b>	<b>8</b>
6.1	Office Hour / Open Lab . . . . .	8
6.2	Study Groups . . . . .	8
6.3	Tutoring . . . . .	8
<b>7</b>	<b>BYUH Learning Framework</b>	<b>8</b>
7.1	Prepare for IT 280 . . . . .	8
7.2	Engage in IT 280 . . . . .	8
7.3	Improve at IT 280 . . . . .	8
<b>8</b>	<b>Standard Statements</b>	<b>8</b>
8.1	Dress and Grooming Standards . . . . .	8
8.2	Accommodating Special Needs . . . . .	8
8.3	Plagiarism . . . . .	8
8.4	Sexual Harassment . . . . .	8

## 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 tech-

nical skills. This course is focused on those skills: creating wiring, connecting 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 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 Servers, is an advanced course where you can develop skill and experience configuring and operating network servers.

IT 480, Computer Network Design, is an advanced course where you can develop skill and experience configuring networking equipment such as switches and routers.

## 1.1 Preparation

We assume you have no special networking experience whatever. We expect you can read, type, send and receive email, and visit web sites. Everything else we will teach you.

## 1.2 There May Be Changes

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 are brave enough, you are welcome to suggest ways the class could be improved.

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

# 2 Course Details

## 2.1 About the Course

- **Course Number:** IT 280
- **Title:** Computer Networking

- **Course Description:** End-user fundamentals including local area networks, home networks, wireless networks, routers, firewalls, ports, address sharing, dynamic host configuration, OSI model, IPv4, netmasks, subnets, and troubleshooting.
- **Textbook:** Networking 101, by Don Colton.
- **Classroom:** GCB 111
- **Start/End:** Mon Jan 7 to Mon Apr 8, 2013
- **Class Time:** MWF 12:10 to 1:10 PM
- **Final Exam:** Fri, Apr 12, 1:00–3:50 PM

## 2.2 My Websites

Here is a list of my other websites that you may encounter this semester.

- <http://byuh.doncolton.com/it280/> is my course homepage. It has links to everything.
- <http://n101.tk/> is the textbook I wrote for this class.
- <https://dcquiz.byuh.edu/> is the learning management system for my courses.
- <http://byuh.doncolton.com/> is my campus homepage. It has my calendar and links to the homepages for each of my classes.
- <http://doncolton.com/> is my off-campus homepage.

## 2.3 About the Instructor

- **Instructor (me):** Don Colton
- **My email:** doncolton2@gmail.com
- **My Office:** GCB 128
- **Office Hour:** MWF 11:00 to 12:00. GCB 111 is reserved this hour so my students can study in a lab setting and meet with me and each other. During this hour I am almost always in GCB 111 or across the hall in my office (GCB 128).

## 2.4 Emailing Me

At times you may want to email me, or I may ask you to email something to me. Here are the rules.

You can email to doncolton2@gmail.com or to don.colton@byuh.edu. They both end up the same place.

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.

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”.

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 will reply within 24 hours to every email I receive, unless it clearly does not need a reply.

I may reply initially with something like “received” so you know I got it. This generally means I have not been able to do whatever was requested, but it is in my queue.

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 a reply within a day, it may mean 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?

### 3 Learning Objectives

The following is a statement of the high-level learning objectives for this course. Each objective can be further divided into many smaller objectives.

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.

## 4 Grading

Here is the actual grade distribution from Fall 2012: (18 students): grade average 3.31, 4.0x9 3.7 3.4 3.0x3 2.7x2 2.0 0.0.

Grading is based on Effort (30%), Labs (16%), Skills Tests (14%), and Memorization Exams (40%). I have made available about 10% extra credit.

### 4.1 Grading Scale

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

#### Grading is based on 1000 points

930+	A	900-929	A-	870-899	B+
830-869	B	800-829	B-	770-799	C+
730-769	C	700-729	C-	670-699	D+
630-669	D	600-629	D-	0-599	F

### 4.2 Tracking Your Grade

I keep an online gradebook so you can see how your points are coming along. It also lets you compare them with other students in the class (without seeing their names).

<https://dcquiz.byuh.edu/> is my personal Learning Management System. That is where I maintain my online grade book.

Your points are organized into two grade books: Overall and Effort.

**IT 280 Overall:** The Overall imports the total Effort and adds your programming and exam performance. It also shows your final grade.

**IT 280 Effort:** The Effort points track the daily updates and study time.

### 4.3 Effort: (50 pts) Daily Update

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 during the 10-minute window of time that starts 5 minutes before class and ends 5 minutes into class.

The DU is worth two points per class period, with 50 points expected (for 25 out of 38 class periods), and 76 points possible. Anything beyond 50 is extra credit. It is also a reward for coming on time, or close enough that you can do the update.

As part of the Daily Update, once a week I will ask you how much time you spent studying the previous week. I will use your report to update your study time points.

### 4.4 Effort: (250 pts) Study Time

We award points for study time (ST), which is time spent engaging with materials directly related to this course.

Each week you are invited to report, on your honor, how many hours you studied during the previous week, Sunday morning through Saturday night. We award two “effort” points per hour of “study,” for a goal of 18 points (9 hours, including class time) and a maximum of 20 points (10 hours) per week, whether there is a holiday or not.

There are 14 weeks.  $14 \times 18 = 252$ .  $14 \times 20 = 280$  (max). Anything beyond 250 points is extra credit.

Most students max out the study time points each

week. This provides them with extra credit that helps ensure they get a good grade in the class.

### Reporting Your Study Time

Once a week I will ask for your study time as part of the daily update.

For study during the very last week, which includes the final exam, you can report on the day of the final exam.

If you do not report in some other way, you can report by sending me the details by email.

Inside the email, say something like: “For the week of (starting month and day) to (ending month and day), I studied (how many) hours.” Be specific about which week it is.

### 4.5 Effort Points are Optional

The effort points (daily update and study time) are there as a safety net. They are easy to earn. They help to make sure you will pass the class.

But when I calculate your final grade, I do it two ways:

- (a) Counting every point, based on 1000 total points.
- (b) Counting all but daily update and study time, based on 700 total points.

Last semester, about 90% of my students did better when I counted their effort points. About 10% did better without.

I use whichever method gives you the best grade.

### 4.6 Skill: (400 pts) “E” Exams

**E1 through E7:** These exams cover the readings in Units 1 through 7. Honestly the exams are mostly about memorizing terminology and knowing answers to commonly asked questions.

Each test has a “pretake” and a regular take. The pretake score is granted a 10% bonus.

**E1:** (47 pts) Basics, Unit 1, Ch 1-4

**E2:** (83 pts) OSI Model, Unit 2, Ch 5-9

**E3:** (57 pts) Home Networking, Unit 3, Ch 10-12

**E4:** (33 pts) Wi-Fi, Unit 4, Ch 13-14

**E5:** (57 pts) Security, Unit 5, Ch 15-17

**E6:** (78 pts) IPv4, Unit 6, Ch 18-20

**E7:** (45 pts) Tools, Unit 7, Ch 21-22

#### 4.7 Skill: (140 pts) “S” Exams

**SN:** (70 pts) q25 Skill Numbers, Ch 18.4

**SS:** (70 pts) q50 Skill Subnets, Ch 19

**SV:** (50 pts) q51 VLSM Subnets (extra credit)

The SN and SS skills-based exams are based on skills taught in the book or in class and are worth 140 points (70 each). The SV exam is extra credit. It is also covered in the text book. SV is an all-or-nothing situation involving about 10 to 15 questions.

**Retakes:** Because these are easy to grade but can require time to master, you can take these each exam day, and your highest score will be kept.

The Final Exam time is about three hours. I plan that it will consist of an opportunity to retake any or all exams previously given. If you are already satisfied with your scores, you can skip the final.

#### 4.8 Skill: (160 pts) Labs

**L1:** (40 pts) Lab 1: Ethernet Cables

**L2:** (40 pts) Lab 2: Router Configuration

**L3:** (40 pts) Lab 3: Wi-Fi Site Survey

**L4:** (40 pts) Lab 4: Dia Network Diagram

#### 4.9 Extra Credit Presentation

You can get 50 points for doing a presentation. Propose a topic. Get me to approve it. Research it. Write up your research. Submit your write-up (PDF). Then do a 10-minute presentation in class where you teach us all about your research.

Sample topics: Spanning Tree, Virtual LANs, the Latest Thinking on Passwords, Certificates, Torrents, Ethics, Being anonymous, Firewalls, Topologies, Setting up a File Server, Setting up a Print Server.

Must be ready for presentation by March 20, but I will schedule the actual date of presentation.

#### 4.10 Other Extra Credit

Report an error in the published materials I provide. In this class, they include the following:

- The course website, parts relating to this semester.
- The course syllabus.
- The course textbook.

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

## 5 Calender

We meet about 38 times plus the final. Every Friday is exam day.

### 5.1 Special Dates

Mo Jan 07 First Day of Instruction  
 Mo Jan 21 No Class: Human Rights Day  
 Mo Feb 18 No Class: Presidents Day  
 Mo Apr 08 Last Day of Instruction  
 Fr Apr 12 Final Exam, 1:00–3:50 PM

### 5.2 Day by Day

Mo Jan 07 38: First Day of Instruction  
 We Jan 09 37: E1 preview  
 Fr Jan 11 36: E1 pretake (Basics)  
 Mo Jan 14 35: SN practice 2 8 16  
 We Jan 16 34: SN practice 10  
 Fr Jan 18 33: E1 exam (Basics)  
 Mo Jan 21 No Class: Human Rights Day  
 We Jan 23 32: L1 build cables  
 Fr Jan 25 31: E2 pretake (OSI)  
 Mo Jan 28 30: L1 build cables  
 We Jan 30 29: L2 router reset, pw  
 Fr Feb 01 28: E2 exam (OSI)  
 Mo Feb 04 27: L2 router role  
 We Feb 06 26: L2 router config  
 Fr Feb 08 25: E3 pretake (Home)  
 Mo Feb 11 24: SS practice (Ch19)  
 We Feb 13 23: SS practice  
 Fr Feb 15 22: E3 exam (Home)  
 Mo Feb 18 No Class: Presidents Day

We Feb 20 21: L2 security  
 Fr Feb 22 20: E4 exam (Wi-Fi)  
 Mo Feb 25 19: L3 Site Survey  
 We Feb 27 18:  
 Fr Mar 01 17: E5 pretake (Security)  
 Mo Mar 04 16: SV practice  
 We Mar 05 15: L4 Dia  
 Fr Mar 08 14: E5 exam (Security)  
 Mo Mar 11 13: SS practice  
 We Mar 13 12: SS practice  
 Fr Mar 15 11: E6 pretake (IPv4)  
 Mo Mar 18 10:  
 We Mar 20 9:  
 Fr Mar 22 8: E6 exam (IPv4)  
 Mo Mar 25 7:  
 We Mar 27 6:  
 Fr Mar 29 5: E7 pretake (Tools)  
 Mo Apr 01 4: ipconfig, ping, tracert  
 We Apr 03 3: nmap, Wireshark  
 Fr Apr 05 2: E7 exam (Tools)  
 Mo Apr 08 1: Last Day of Instruction  
 Fr Apr 12 0: Final Exam, 1:00–3:50 PM

### 5.3 Excused Absences

You can see that I have build a bit of slack into the grading so you can miss a few days (or assignments) if you need to, and still earn an A. Taking a friend to the airport? Taking your spouse or child to the doctor? Taking a field trip for another class? No problem. You are excused.

Class activity assignments are due soon after they are assigned, but I normally allow late work at full credit for two more weeks (except at the end of semester).

Every exam is given at least twice and I keep your highest score, so if you have to miss an exam, my advice is to study harder for when I offer it again. If you miss all the times I give a certain exam, you can make it up during the final exam time.

The scheduled final exam consists of an opportunity to retake **any** exam that was offered during the semester. If you are happy enough with your previous scores, **you can skip the final**.

Beyond that I do not offer special treatment to anyone except in HIGHLY unusual situations.

If you have to miss an E exam, since there are three chances to take each one, my advice is to study harder for one of the other opportunities.

If you have to miss an S exam, there are more than three chances to take each one, my advice is to study harder for one of the other opportunities.

## 6 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. My door is often open.

### 6.1 Office Hour / Open Lab

This semester during my “office hours” I operate an open lab (a study hall) MWF from 11:00 AM to 12:00 noon in GCB 111. I will be present in GCB 111 or in my office to assist students that come. The room is available for your use in working on your projects, either individually or in groups.

The CIS department operates an open lab with tutors, also in GCB 111, most afternoons and evenings.

### 6.2 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.

A good time for your study group to meet is during the study hall. Eat lunch together (carefully) and work on the class activities.

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.

### 6.3 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.

Not all of the tutors know about everything. But all of the tutors should know which tutors do know about whatever you are asking about, so they can direct you toward the best time to get your questions answered.

There are networking-savvy student workers in GCB 103. 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. My door is open.

## 7 BYUH Learning Framework

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

### 7.1 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 on time. 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 my lectures.

### 7.2 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 requested to help those that want assistance. It is amazing what you can learn by trying to help someone else.

### 7.3 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, with possible rare exceptions, I allow you to see every score and every comment and every answer submitted for every question. Review your answers and those of other students. See how your answers could be improved. If you feel lost, study the assigned readings again.

## 8 Standard Statements

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.

### 8.1 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.

## 8.2 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 any disability that may impair your ability to complete this course successfully, you are invited to contact the Students With Special Needs Coordinator at 808-675-3518. Reasonable academic accommodations are made for all students who have qualified documented disabilities.

## 8.3 Plagiarism

<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 violation 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.

## 8.4 Sexual Harassment

BYUH’s policy against sexual harassment complies with federal Title IX of the Education Amendments of 1972 to protect university students from student-to-student sexual harassment both in and out of the classroom setting. Any incidents of such student-to-student harassment should be reported to either the Director of Human Resources (808-675-3713) or the Honor Code Office (808-675-3531). Allegations of sexual harassment are taken seriously. Upon receiving a report of sexual harassment, the Director of Human Resources will take appropriate action to resolve and correct conditions resulting from individual perceptions or from inappropriate behavior.