IT 480 – Computer Network Design
Course Syllabus and Calendar – Fall 2013

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Brigham Young University–Hawai'i

Contents

1 Overview

The main objective for this course is to prepare you to function as a network administrator for an organization with many computers, switches, routers, and other network equipment. We will strive to achieve a level of learning that would prepare you to pass the Cisco® Certified Network Associate (CCNA®) Examination.

(There are probably a lot of registered trademarks in this syllabus. I do not claim them. They belong to whomever owns them. From here on out, I will not worry too much about using the ® symbol.)

There are three certifications that I hear a lot about. CCNA is one of them. The other two are A+ and MCSE. There are other certifications that I don't hear much about. CCNA is one of the major certifications that employers will recognize by name.

I earned my CCNA certification on Sep 8, 2010. (It expired three years later.) My score was 860 out of 1000. The score required to pass was 825. Before taking the exam, I studied extensively for about three weeks including reading about half of the Lammle textbook we are using and taking numerous practice tests. I also prepared over the past years by having an active interest in networking, teaching the introductory networking course here at BYUH, and team-teaching this CCNA course in 2008. (I was the junior instructor. My son Joseph was the senior instructor. I was mostly just along for the ride and to learn what I could. He did the heavy lifting.)

I believe that some students could earn their CCNA by the end of this semester. To do so will require more than three credits worth of work on your part. If you put in the nominal three credits of effort we all know and love, you will not pass the CCNA, but you will still be able to get a good grade in the class. If you want to take the CCNA later, there may be a chance for you to take another IT class like IT 495 where you can earn credits for the time and effort you put into it.

1.1 Prerequisites

The IT 280 course (which I also teach) is to introduce you to the concepts of networking. We cover home networking, Wi-Fi, security, and IPv4. For this course, IT 480, I will mostly assume that you know all of those things.

For IT 480, we will focus on routers and switches. These are the key components of which business networks are constructed. We cover the topics most

likely to help you pass the CCNA examination so that you can become a Cisco Certified Networking Associate.

Coming out of IT 280, Computer Networking, you should be familiar with basic networking concepts such as the OSI model, protocol data units like packets and frames, tools like ping and traceroute, and the IPv4 addressing structure including subnetting. On the assumption that a refresher might be helpful, the first few weeks of class will be devoted to review of that material (at an accelerated pace).

1.2 There May Be Changes

Like all courses I teach, I will be looking 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 specific ways the class could be improved.

2 Course Details

2.1 About the Course

- **Course Number:** IT 480
- **Title:** Computer Network Design
- **Course Description:** Networking of computers and configuration of managed networking equipment including switches and routers, with special emphasis on Cisco equipment and protocols. (Prerequisite: IT 280.)
- **Textbook 1:** Networking 101, by Don Colton.
- **Textbook 2:** CCNA, Todd Lammle, 7e
- **Textbook 3:** CCNA 640-802 Net Simulator.
- **Classroom:** GCB 101
- **Start/End:** Tue, Sep 10 to Tue, Dec 9
- **Class Time:** TTh 13:50 to 15:20
- **Final Exam:** Thu, Dec 12, 16:00–18:50

2.2 Important Website Links

- **Don Colton Home Page (General):**
  http://doncolton.com/
- **Prof Colton Home Page (BYUH):**
  http://byuh.doncolton.com/

- **IT 480 Course Home Page:**
  http://byuh.doncolton.com/it480/
- **Networking 101 Textbook:** PDF
  http://n101.tk/
- **My Learning Management System:**
  (Grade Book, Exams, etc.)
  https://dcquiz.byuh.edu/
- **IT 480 Network Labs:**
  https://dcnetlab.byuh.edu/

2.3 About the Instructor

- **Instructor (me):** Don Colton
- **My email:** doncolton2@gmail.com
- **My Office:** GCB 128
- **Office Hour:** MWF 13:20 to 14:20

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

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:

* Correctly identify all subnet characteristics given a few of them.

* Correctly use CISCO IOS commands to configure routers and switches.

(more to be added)

4 Textbooks

There are three textbooks.

4.1 Networking 101 (Free)

The first is one I wrote for the IT 280 class. We will cover it during the first few weeks of class by way of background material. You should know and understand all the important concepts that it contains.

Fortunately it is free.

4.2   Lammle, 7e

The second textbook I have selected is "**CCNA, Cisco Certified Network Associate Study Guide**" by Todd Lammle (pronounced lamb-lee). We will use the seventh edition, copyright 2011. The publisher is Sybex. The ISBN-13 number is: **978-0-470-90107-6**. The book is available on Amazon (2011) for right around $27. A Kindle edition is also available, but I recommend the paperback.

The book was updated in 2011 to keep pace with the changing CCNA exam. As networking develops and improves, some older skills are not needed as much and other newer skills take their place. For example, Wi-Fi has become a much bigger deal in the past five years and it is covered in 7e better than in previous editions.

If you do not have 7e at this time, you should order it. In the mean time, you can survive with an older copy for the first few weeks. Older copies should be available for free or really cheap.

There are two main textbooks in this market. We are using Lammle. The other one is by Wendell Odom who writes for Cisco Press. Odom has a good reputation for highly reliable and carefully written material. Lammle has a good reputation for making things understandable. Pick your poison. I decided on Lammle because I think most of us need understandable at this point, and can fine tune our understanding later. You may find parts of Lammle where he has simplified a concept so much that it is no longer totally accurate. Live with it, I guess.

4.3   Network Simulator

The third textbook I have selected is "**CCNA 640-802 Network Simulator**" by Wendell Odom and Jeffrey S. Beasley. We will use the second edition, copyright 2012. The publisher is Pearson. The ISBN-10 is 1-58720-444-4. The ISBN-13 is **978-1-58720-444-9**. We will do a group purchase after the semester starts, and will sell them to you for about $80. The List Price is $149.99.

For that you get a CD-ROM and a single-user license. Do not buy a used copy as the activation codes have already been used.

We tried this out last year and it was very successful. It seems to be an excellent tool for helping students really master the hands-on aspects of Cisco network design.

I am betting that this one is a "keeper" that you will benefit from greatly as you prepare to take the CCNA exam.

So, this one is "required."

4.4   CCNA Practice Exam

Cisco offers a practice exam for about $80. I bought it and have used it extensively to prepare for the real exam. I recommend it, but I think the lab simulator might be just as valuable.

So, this one is "recommended" but certainly not required.

4.5   CCNA Exam

Okay, this is not really a textbook. But you might as well know what you are up against.

The exam comes in two flavors. The one-sitting version costs $250 the last I checked, and covers everything all at once. That's the version that I passed, but none of the students have passed it yet.

The two-sitting version costs $125 for each half. I recommend students take the first half, and if they pass it, then take the second half. That way you have less money at risk.

5   Grading

Grading is on a standard 60/70/80/90 model using 1000 points. You earn points for effort (400) and skill (600), with some extra credit possible.

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

https://dcquiz.byuh.edu/ is where I track your progress online. It is my personal Learning Management System. There I maintain an online grade book. You can see how your points are adding up. You can compare your points with those of other students in the class (without seeing any names).

5.1   Effort: (400) Simulator

This category is partly effort and partly skill, but I am listing it under effort for now.

CCNA 640-802 Network Simulator, Second Edition helps you develop and improve hands-on configuration and troubleshooting skills without the investment in expensive lab hardware. This state-of-the-art, interactive simulation software enables you to practice your networking skills with more than 300 structured labs designed to help you learn by doing, the most effective method of learning. The labs are divided into four different types: 183 skill builder labs which help you practice short, focused configuration tasks, 47 complex configuration scenarios, which present realistic multi-layered configuration tasks, 20 challenging troubleshooting scenarios, which provide you with an opportunity to test your problem identification and resolution skills, and 50 subnetting exercises, which help you improve the speed and accuracy of your subnetting calculations.

The first edition is apparently identical except it does not have the 50 new subnetting exercises.

Each activity is worth points.

(183) Each of the 183 skill builder labs is estimated to take about 5 minutes, and is worth 1 point.

(141) Each of the 47 complex configuration scenarios is estimated to take about 10 minutes, and is worth 3 points.

(60) Each of the 20 troubleshooting scenarios is estimated to take about 10 minutes, and is worth 3 points.

(50) Each of the 50 subnetting exercises is estimated to take about 5 minutes. They are not worth any credit at this time, but maybe they will be in the future.

5.2   Skill: (300) DCQuiz Exams

- 60p SN: Skill with Numbers quiz.
- 60p SS: Skill with Subnets quiz.
- 60p SV: Skill with VLSM quiz.
- 120p E2: OSI Memorization.

The SN exam will consist of 60 questions worth 1 point each.

The SS exam will consist of 60 questions worth 1 point each.

Two SV exams will consist of a scenario broken into between 10 and 15 questions. To solve the scenario you must get the entire scenario correct. If you get it totally right, you earn the 30 points. (We keep your highest two scores.)

The E2 exam consists of about 72 questions that can be found in Unit 2 of the Networking 101 text book. Questions vary in their difficulty and the points assigned. Your score will be scaled such that 100% correct is worth 120 points.

5.3   Skill: (300) DCNetlabs

- 30p N1: Change Router Hostname
- 30p N2: IP Address Modification
- 60p N3: Lost Password Recovery
- 45p N4: Router and One Switch
- 45p N5: Router and Two Switches
- 45p N6: Two Routers and RIPv2
- 45p N7: Two Routers and EIGRP

5.4   Points Summary

- Simulator: 400
- Skills Tests: 300
- DC Netlabs: 300
- Total: 1000

5.5   Extra Credit Presentation

Extra Credit Presentation. Worth 50 points. Propose a topic. Get it approved. 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: Wireshark, Spanning Tree, VLANs, the Latest Thinking on Passwords, Certificates, Torrents, Being anonymous, Firewalls, Wi-Fi Mesh, Packet Radio, IPv6, Ad hoc networking.

Must be ready for presentation by November 15, but I will schedule the actual date of presentation.

5.6   Extra Credit Errors

Report an error in the materials I provide. I always provide a syllabus and a course website. I may provide other materials, such as a textbook, a study

guide, and sample tests. Each error reported can earn you extra credit.

6   Calendar

Here is what you can learn from the calendar: (a) when the exams are happening, and (b) what to study.

This calendar shows my plan for when things will happen. It will be updated as we go through the semester.

Each class starts with a quick daily update (five minutes) and an opening prayer. After that, we spend time looking at your comments and discussing them. Then we launch into the material I have prepared for the day. Hopefully the material is an in-class activity, but it might be a lecture. The calendar lists my plans as they currently stand, but I know I will have to make changes and improvements as we go along.

6.1   Day By Day

This calendar is intended to tell you what to study, and when to expect exams.

This class is only taught once a year, and each time I teach it, I am always trying something different.

    Th Nov 07   ISECON, No Class
    Tu Nov 19   EIL Program Review, No Class
    Th Nov 28   Thanksgiving, No Class
    Th Dec 12   Final

6.2   Excused Absences

My policy on absences is to build enough slack into the schedule that you can miss a day whenever you need to. Take a friend to the airport? Take your spouse or child to the doctor? Take a field trip for another class? No problem.

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.**

Because the final is just a retake, if you want to take the final but you have to miss it, **normally** I just say no, or I require you to take an Incomplete in the class and make it up the next time I teach the class.

Rare: There is always an exception. It might be you. If you have a situation that does not fit inside these guidelines, come and see me as soon as you know about it. If we plan ahead, it reduces the difficulties.

7   Support: Tutoring, etc.

7.1   Tutoring

For the most part, there is no tutoring available for this class. It is a 400-level course that is taught once a year, and the students who could tutor have probably already graduated and are gone.

My advice? Form a study group.

You **may** be able to get some assistance from the lab guys that hang out in GCB 103, who work for Micah Uyehara.

7.2   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.

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.

8   BYUH Learning Framework

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

8.1   Prepare for IT 480

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 480: Make reading part of your study. 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.

8.2   Engage in IT 480

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 480: to be added

8.3   Improve at IT 480

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 480: After each exam, review your answers and those of other students. See how your answers could be improved. If you feel lost, read the readings again.

9   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.

9.1   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.

9.2   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.

9.3   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.

In this course group work is permitted and encouraged but you are not allowed to turn in work that is beyond your understanding, whether you give proper attribution or not. Make sure you understand what you are submitting and why each line is there.

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. However, you are nearly always allowed (and encouraged!) to test your program by actually running it on the computer where you are sitting. Students caught cheating on the final exam may receive a grade of F for the semester, no matter how many points they may have earned, and they will be reported to the Honor Code office.

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.

9.4   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.