UTAH VALLEY UNIVERSITY
COURSE SYLLABUS
CS 4610 - TCP/IP INTERNET ARCHITECTURE

SEMESTER: Fall 2019
Section 1 Tu/Th 4:00 – 5:15pm CS412

INSTRUCTOR: Dave Heldenbrand
Office: CS 520R Orem Campus
Office Hours: M 3:00 – 4:00; Tu & Th 2:30 – 4:00; W 2:00 – 3:00; or by appointment
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ATTENTION STUDENTS WITH DISABILITIES

Students who need accommodations because of a disability may contact the UVU Office of Accessibility Services (OAS), located on the Orem Campus in LC312. To schedule an appointment or to speak with a counselor, call the OAS office at 801-863-8747. Deaf/Hard of Hearing individuals may email `accessbilityservices@uvu.edu` *or text 385-208-2677.*

COURSE DESCRIPTION

You were introduced to TCP/IP in CS 2690 Computer Networks II. TCP/IP is the foundation upon which the Internet is built, and has become the "common denominator" that allows a wide variety of different computers, operating systems and networks to communicate. CS 4610 explores the TCP/IP protocol suite in detail, from both theoretical and practical perspectives. We'll examine the architecture of each of its major elements, and learn how each supports the overall Internet computing environment.

PREREQUISITE COURSES AND COMPETENCIES

CS 2690 is the prerequisite. *A working knowledge of communications architectures and protocol theory is assumed.*

COURSE OBJECTIVES

Upon completion of the course, you should have gained a detailed understanding of the following topics and technologies:

1. Internetworking theory and standards
2. Internet Protocol (IP)
3. IP addressing issues
4. IP routing concepts
5. Transmission Control Protocol (TCP)
6. Routing Protocols (RIP, OSPF and BGP)
7. Multicasting
8. Simple Network Management Protocol (SNMP)
9. IP version 6 (IPv6)
10. Internet security and firewalls
11. Voice over IP (VoIP)

12. The Domain Name System Protocol (DNS)

COURSE MATERIALS

Douglas Comer. Internetworking with TCP/IP, Vol. I. 5th (NOT 6th) ed., Prentice Hall, ISBN 0-13-187671-6. Note that there are many TCP/IP books by Comer in various volumes and editions, and with similar sounding titles, so be sure you get the correct book

The slides used in the lectures were created using PowerPoint (.pptx format), and are available in the Canvas course management system. There is a separate .pptx file for each lecture's slides. Slides are often updated a day or so before the lecture and any significant updates will be announced in Canvas. The revision date is shown at the lower left-hand corner of each slide, and will be updated each time a significant modification is made to the slides.

You can view and print the slides from within Canvas (click *Files* and *preview*) or use the PowerPoint Viewer at https://www.microsoft.com/en-us/download/confirmation.aspx?id=56523. There is also an online PowerPoint Viewer at https://office.live.com/start/PowerPoint.aspx.

Sometimes the Canvas slide viewer doesn't render the graphics properly in the PowerPoint slides. Alternatives that seem to work correctly include the Google slide viewer, Office 365 and the free Microsoft PowerPoint viewer for Windows. Microsoft no longer provides a PowerPoint viewer for macOS, but Keynote seems to render the slides correctly. *Other presentation applications (such as LibreOffice Impress) do not display subscripts and superscripts in numeric formulas properly, which may cause you to miss homework questions.*

Supplemental readings are located in the `/Reading Assignments & Tutorials/` folder. They are generally in .pdf format, so you'll need a PDF reader such as Adobe Acrobat Reader, which can be obtained at https://get.adobe.com/reader/. Some browsers also display PDF files.

LAB ACCESS FEE

Dedicated lab facilities for this course are located in CS 516 (the "Network Lab"). You have paid a lab access fee for this course. This fee is used for the computer hardware in the labs, servers, printers, paper, toner, upgrade and maintenance of hardware and other software that applies to all users. It also entitles you access to resources as required by your course. This fee also entitles you to print 100 pages (black and white) in the lab. Additional print credits may be purchased.

CLASS PROCEDURES

The text provides well-organized introductory material. *Reading the assigned material prior to the relevant lecture may be the most important thing you can do to improve your performance in this class.* The course moves quickly in order to cover the required material, so it is *essential* to keep up with the reading. Many lectures will cover a topic in greater detail than it is covered in the text. Some topics are covered *only in lectures*, so attending the lectures is essential. Feel free to record the lectures for your personal use.

Illustrations used in the lecture are contained in the PowerPoint slides described in the Course Materials section. You may wish to print the slides or reference them on a laptop or tablet so that you can annotate the illustrations during lecture.

Messages of general interest to the class, along with last minute changes and updates, will be communicated using the *Announcements* page in Canvas. Feel free to use the Canvas *Discussions* page for communication of general interest to the class (nothing commercial or off topic, please). If you have a problem that requires my immediate attention, use a Canvas message or the email address listed on page 1.

Please be considerate of your peers in class. Use of cell phones (including texting), gaming and other distracting activities are not permitted in class. Still and video photography are not permitted in class without instructor permission. If you have a special need, see me and I will be happy to accommodate you when possible.

GRADING

Your achievement of the course objectives is evaluated based on the following criteria:

Test 1	21.6% (216 points)
Test 2	21.6
Final Test	21.6
Quizzes	8
Homework	8
Lab Exercises	19.2
TOTAL	100%

Final grades will be assigned based on the following scale:

93.0% and above	A
90.0% and above	A-
87.0% and above	B+
83.0% and above	B
80.0% and above	B-
77.0% and above	C+
73.0% and above	C
70.0% and above	C-
67.0% and above	D+
60.0% and above	D
below 60.0%	E

Up to 25 extra credit points (2.5%) will be awarded for attendance (see Attendance Policy). *Semester grades will not be adjusted or rounded up because they are "close" to a higher grade. For example, a 92.99% in the Canvas "Total" column will be an A-. (A minimum of 93.0% is required for an A.)* You can check your current status at any point during the semester by viewing the "Total" column on the Canvas Grades page. The percentage and letter grade shown will reflect your current standing, based on assignments and tests that have been graded at that point in the semester.

ATTENDANCE POLICY

Attendance will be taken at each session. If you are receiving financial aid, you must attend class. *I will not sign financial aid forms that misrepresent your attendance or course standing.*

Lectures are the focal point of this course, so to incentivize students to attend regularly, up to 25 extra-credit points (2.5%) are available toward your final grade. You can miss two lectures without penalty. Five points will be subtracted from the 25 possible extra credit points for each lecture missed beyond two. (So if you miss seven or more lectures, you won't receive any extra credit.) Because this is *extra* credit, excused absences for illness, business travel, etc. are not allowed. *DO NOT sign the class roll for a previous date without discussing the reason with me*

first. Students who do so will receive no extra credit for attendance. You may sign the roll if you arrive late or leave early (within reason).

HOMEWORK

Homework assignments are due into Canvas before class begins on the date indicated in the schedule and in Canvas Assignments. To receive credit for homework assignments, they must be submitted in word processed format (except for illustrations and tables). *Late assignments will not be accepted for credit.* Bring a paper or electronic copy of your answers to class so that we can discuss the assignment.

At the end of the semester, your "raw" homework points will be totaled and divided by the total available "raw" homework points to yield a percentage. That percentage will be multiplied (weighted) by the percentage of total homework points available (as described in the Grading section above) to yield the homework percentage applied to your final grade. For example, if you submit 4 out of 4 homework assignments, but only receive 5 of 10 possible points for each, you would receive 20 "raw" points, out of a possible 40 (50%). If 8% of your final grade is based on homework questions, that would yield 4% toward your final grade.

LAB EXERCISES

This course includes a number of hands-on lab exercises. Most will be done individually, using a MikroTik router that will be checked out to each student at the beginning of the semester. Students who have Ethernet-based Internet access at home and administrative control over that Internet connection will be able to complete most of the labs at home. Those who do not should contact the instructor to discuss alternatives. A few lab exercises use multiple routers, and will require students to work in teams.

Lab exercises are due before the start of class on the due date, which is specified at the beginning of the lab exercise, on the course schedule, and in Canvas Assignments. To receive credit for lab exercises, lab reports must be submitted in word processed format by the specified date and time. Acceptable file formats are pdf, doc, docx, odt, and rtf. Bring a paper or electronic copy of your lab report to class for discussion. The method for scoring lab exercises will be provided with Lab Exercise 1.

QUIZZES

Quizzes will be announced in the preceding lecture, and are usually given at the beginning of class. Tentative quiz dates are listed in the schedule, however the quiz schedule may occasionally be changed. If you are not present when the quiz is given, you won't be allowed to take it for credit. You may obtain a copy of a quiz for study purposes after it has been given. The method used to calculate quiz points at the end of the semester is as described for homework questions above. Quizzes may be taken in advance by prior arrangement, given a reasonable excuse (business travel, etc.) and assuming at least 75% attendance up to that point.

TESTS

Tests 1 and 2 will be administered by UVU Testing Services in the Testing Center. The test dates are given in the course schedule. Tests will be available in the Testing Center for three days, allowing you to take the test at your convenience. Scratch paper may be used, but it will not be returned to the instructor. Students are urged to take the test at the earliest possible time, as the Testing Center tends to get backed up, especially at night. Check https://www.uvu.edu/testingservices/ for Testing Services hours of operation and other information.

Testing Services Policy dictates that tests which run for three days will include two late testing days. Students taking the test on a late testing day will be charged a $4 fee, payable to Testing Services. The late testing option should be used only in emergencies such as illness or transportation problems. *If you are unable to take the test on the late testing days for any reason (including too few test forms, long lines, transportation problems, technical problems at Testing Services or illness), you will not be permitted to make up the test. In other words, the late testing dates are the makeup dates.* Students unable to take the test during the scheduled testing period must make arrangements in advance with the instructor to take the test early. Tests 1 and 2 are untimed, so you will have as long as you need to complete them. Be sure you allow enough time to finish before Testing Services closes for the day.

"Post mortem" discussion of tests will be done during the designated lectures (see course schedule). Unless there are extenuating circumstances, I won't discuss tests with students who fail to attend the post mortem. Students present during the post mortem are welcome to schedule appointments to ask follow-up questions or pursue unresolved issues. Some test questions will pertain to material which is covered in the lectures, but not in the text, and vice versa.

The final exam will be given in class during final exam week (see course schedule). If you have more than three finals on a given day, you may request an exception. *Exception requests must be made by the date specified in the course schedule.* Check your final test schedules now to determine if you have a conflict.

DROPPING THE CLASS

The last day to drop the course without it showing on your transcript, to receive a 100% refund, or to add or audit the course is listed in the Student Timetable at https://www.uvu.edu/schedule/index.html. The last day to drop the class is also listed there. Attempting to withdraw from the course after that date will be difficult, since the department chair's signature is required, along with a rationale for the late withdrawal request. *If you stop attending class without doing a formal drop or withdrawal, the instructor cannot do anything at the end of the semester except assign a grade based on the number of accumulated points (typically an E or a UW).* Subsequent appeals for grade change must be made to the UVU Academic Standards Committee.

PROGRAM OBJECTIVES

In compliance with departmental accreditation by ABET, the Computing and Networking Sciences Department has established program objectives that apply to the Bachelor Degree in Computer Science. Those objectives are available on the CS Dept. website at https://www.uvu.edu/cs/docs/accreditation_objectives_assessments.pdf.

ETHICAL BEHAVIOR

The CS Dept. ethics policy, "CS Imperatives of Ethics and Conduct" is posted at https://www.uvu.edu/cs/ethics.html. If you are not familiar with this policy, read it and *be sure that you understand it.* Schedule an appointment with me if you need to clarify anything in the policy. The policy contains guidelines that define cheating in the context of CS courses.

Note the following:

- Submitting material(s) obtained from the Internet and/or world wide web, or from another student, as one's own work, without proper acknowledgment of the source, is a flagrant offense.

- Disciplinary actions will depend upon the nature of the offense and are up to the instructor. A first offense typically results in a failing semester grade, immediate expulsion from the course, and filing a report with the UVU Director of Student Conduct (https://www.uvu.edu/studentconduct/). Repeated or flagrant violations may result in permanent expulsion from the Computer Science program, and possible expulsion from the university.

Simply put, this means that in this course, if you submit someone else's work as your own, you will receive an E as a final grade for the semester. This includes homework assignments and lab exercises.

EMERGENCY COURSE CANCELLATION DELIVERY

In the event of an extended campus closure, instruction will continue using lecture notes and other materials provided through Canvas. Emergency closure notification will be made through UVU's "Opt In" text messaging system. You will find Opt In instructions at https://www.uvu.edu/safety/emergency.php. Consider subscribing to this unobtrusive system, which will also alert you to campus security issues and weather-related campus closures. During this time, course assignments will be submitted via Canvas. Tests will be deferred until campus reopens.

HANDLING PROBLEMS

When problems occur, I will do my best to work out a reasonable solution. *The likelihood that we can find a solution is greatly increased if you communicate with me immediately, either in person, by email or phone.* It is not uncommon for a student to "disappear" sometime during the semester, only to reappear after final exams, asking "What can I can do to pass your class?" At that point, my answer must be "nothing". Unless you have a serious, documented medical problem, you won't be eligible for an Incomplete (I). Obviously, the E is typically received in this situation can have a negative effect on GPA, financial aid and/or immigration status, so keep in touch if you are absent for multiple lectures.

A FINAL POINT

Classroom lecture time is the central focus of much outside preparation on the part of the instructor and the students. It is a scarce resource that should be used wisely. This course will be more valuable to you and to other students if you:

- Arrive on time
- Sit near the front of the classroom, when possible
- Do the assigned reading before class
- Get an early start on homework, labs and programming assignments in case you need to obtain assistance
- Ask questions that help to clarify your understanding
- Avoid questions that are "off the topic" (I'll be happy to discuss anything after class)
- If you haven't already done so, please consider adding a "head shot" photo to your Canvas profile. That makes it easier for the instructor to learn your name.