Syllabus

0.1 Staff Information

Instructor	Dr. Justin P. Rohrer
Office	Glasgow East 118
Office Phone	+1 831 656 3196
Email	`jprohrer@nps.edu` (preferred)

In general I am happy to answer questions via email and/or in person and you are welcome to drop by my office at any time, however with maximum telework in effect this quarter we will be relying primarily on Sakai Forums for answering questions.

0.2 Meeting Times

Event	**Room**	**Day/Time**
Lecture	Online	MTWTh: 14:00–14:50
Lab	Online	Th: 08:00–09:50
Final	Online	TBD

0.3 Class Description

CS3502 Computer Communications and Networks (4-2). This course covers basic computer networking concepts and technology through the study of protocols at each layer of the Internet architecture. Materials taught in class are reinforced through laboratory projects. This course addresses the theory and principles of local and wide area networking, as well as the data communications infrastructures that support data transfer between host entities. Students will gain a solid theoretical base upon which to build specific implementation frameworks. Prerequisite: a solid background in Computer Architecture, Algorithms and Data Structures, and programming experience with Python are important for success in this class.
PREREQUISITES: CS2011 and CS3030

0.4 Course Goal

Enable students to understand the principles of networked communication as a basis for architecting, analyzing, and debugging networked systems. The course takes a top-down approach to reach this goal, beginning with common applications (web, email, etc) and progressively "uncovering" their lower-level operations. Students will become facile not only with IP protocols, but also gain an appreciation for the fundamental architectural decisions that led to these protocols and the Internet's success.

0.5 Learning Outcomes

Upon successful completion of the course the student shall be able to describe the function of each layer of the key networking models (both ISO and Internet). The student will be able to discuss, with examples, the basic routing and forwarding processes necessary to deliver traffic across a network. The student shall be able to evaluate the advantages and disadvantages of the various transmission media and local area network implementations.

Examples of specific discussion topics from previous quarters:

- Describe the structure of the Internet
- Discuss the purpose and benefit of layered models as specific to network design
- Describe the function of each layer of the Internet architecture
- Characterize the key protocols of each layer of the Internet Model
- Recognize the benefits of using formal methods such as statistical analysis and finite state machines to analyze network behaviors
- Understand the use of performance assessment tools such as ping, traceroute, and packet sniffers and analyzers
- Diagram how e-mail, FTP, DNS, DHCP, and the Web work
- Implement a simple network program, using the TCP or UDP socket API
- Discuss the advantages and disadvantages of the various transmission media and local area network implementations
- Compare and contrast network devices, to include repeaters, hubs, bridges, switches, routers, and gateways
- Understand how Ethernet works
- Generate a Cyclic Redundancy Check and Internet Check sum for a set of data
- Determine the maximum capacity of a data link given its bandwidth, signal methodology, and signal-to-noise ratio
- Represent a data link access method using communicating finite state machine diagrams

0.6 Textbook

Required textbook for this class:
Computer Networking: A Top-Down Approach (7th or 8th Ed.)
By James Kurose and Keith Ross, Pearson Education, 2017.
ISBN: 978-0133594140
`http://www.pearsonhighered.com/kurose-ross/`

0.7 Class Schedule

A mix of interactive lectures and problem solving exercises will be used to investigate the topic material in class. Students are responsible for reading the material in the text that supports each topic of discussion prior to its presentation. Supplemental material may be provided as necessary to augment material in the text.

Our schedule will evolve over the duration of the quarter; check back frequently as this the primary mode of coordination.

0.8 Distance-Learning Norms

The Computer Science Department has provided a 1-page documents to establish guidelines for participation in distance-learning classes, and it is available on Sakai named `DL Norms and Expectations.pdf` under "Resources". The goal of providing this is to maintain the quality of the learning environment to be as close as possible to in-person class periods.

0.9 Homework/Labs

As this is an *applied* course on network communications, there is a strong emphasis on hands-on labs and homework exercises which account for a significant portion of your grade. Labs and homework will be assigned via the web site. Assignments will vary in scope, in some cases spanning multiple weeks. Due dates will be posted on the class schedule. All assignments will be submitted via the Sakai website. You may discuss your assignments with others in the class, but your solutions and writeup must be exclusively your own. *You must list all collaborators.*

0.10 Exams

We will have one midterm exam during a regularly-scheduled class period, and one final exam during the final exam slot. At the discretion of the instructor, exams may be delivered online via the Sakai website.

0.11 Grading

Component	Number	Weight
Exams	2	50%
Homework	5	25%
Labs	8	20%
Class Participation	$< \infty$	5%

Late work accrues a penalty of 10% off per day.

0.12 Continued Study

This course is only an introduction to the field of computer networking; many of the fun, interesting, and important topics are not covered – and indeed many remain unsolved research problems. Should you decide to continue in the networking track of the computer science curriculum, the Network Track course matrix details a program of study.

0.13 Notices

Academic honesty: Abide by the **NPS Honor Code**, *no exceptions.*

As stated in the NPS Student Information Handbook and Academic Honor Code, all students are expected to complete their own work, understand and avoid plagiarism, and follow NPS policy on academic integrity and honesty. Anyone found violating these standards will be punished. Simply put: *Give others credit for their ideas and do not misrepresent others work, words, or creations as your own.* If you have **any** questions, ask **before** you submit your papers!

> **Note:** NPS is a government organization, not just an academic institution. You are *risking your entire career*, not just your course grade, if you willfully violate the Academic Honor Code.

Citation Style: NPS uses Chicago notes-bibliography style for citing. Proper citing is a requirement for academic papers and good practice for writing your thesis. For reference please see `http://libguides.nps.edu/citation/chicagonb`.

Graduate Writing Center: Use of the GWC is optional, but highly recommended if technical writing is not your strong suit. Consultation could involve anything from brainstorming, dissecting readings, outlining, organization, argumentation, grammar, punctuation, citing,

or paraphrasing. See `https://my.nps.edu/web/gwc/meet-with-a-writing-coach`. The Graduate Writing Center (GWC), located on the first floor of the Dudley Knox Library and at `https://my.nps.edu/web/gwc`, is a resource for all NPS students, regardless of their comfort or proficiency with academic writing. The center offers one-to-one coaching, hands-on workshops, and online and hard-copy reference materials to support students throughout their time at NPS.

Reasonable Accommodations for Students with Disabilities: Any student who feels he or she may need an accommodation based on the negative impact of a disability on their work should contact their program officer and professor to discuss specific needs. Please see `https://my.nps.edu/web/gwc/special-needs-reasonable-accommodation` for more information.