

# Syllabus and Policies for CMSC 711: Graduate Computer Networks

Neil Spring

Spring Semester 2009

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**Class** TTh 11:00am-12:15pm CSIC 3120

**Office hours** By appointment (email the night before) or drop by 4133

**Web** <http://www.cs.umd.edu/class/spring2009/cmcs711>

## 1 Goals of this course

The primary goal of this course is to prepare you to collaborate with networking researchers. This means being able to have an intelligent conversation with networking researchers when you interview, being able to read and comment on papers written by your friends in networking and systems, and having an eye for networking research problems that appear in your own work.

Students already involved in networks and systems research should take extra care to understand not only how the topics covered in this course relate to their area of interest, but also to master the style of writing good systems research papers. That is, while I expect all students to comprehend the insight and contribution of the papers we read in this class, I expect systems students to pay particular attention to the evaluation methods, the organization of the papers, and how to mimic both.

## 2 My philosophy of a systems course

I do not believe in wasted work. I have chosen short papers where longer ones are unnecessary. The course projects will be (for the most part) original research that can, with sufficient effort and a little luck, produce publication-quality research. My role in this course is to facilitate your learning: lecture will not be the primary means of learning. You will learn most by reading, thinking, listening to your peers, and doing.

There are differences between graduate networks and undergraduate networks. First, you are grown-ups, responsible for your own learning and motivated to pursue it, so the class can spend less time on textbook-described details. Second, you are researchers, who evaluate ideas based on the problems they solve, their novelty, the completeness of the solution, etc., rather than on market success or the importance of skills. The result is that we spend more time evaluating new and potentially bad ideas rather than established solutions.

### 3 Background Reading

If you find yourself unfamiliar with the vocabulary of the course, have not yet taken an undergraduate networking class, or would like to make sure you understand the concepts in a textbook-like presentation, I *recommend*:

- Larry Peterson and Bruce Davie. Computer Networks: A Systems Approach. 3rd edition.
- W. Richard Stevens. TCP/IP Illustrated Volume 1.
- Wikipedia. It doesn't suck.

These are *recommended*, but not required (I will assign no readings and no exercises from these books). It would be reasonable to share a copy with a friend or borrow an older edition. Stevens's book is a true classic; I refer to it from time to time. Peterson's book covers many things in less detail, but is easy to read. Other books include:

- Andrew Tanenbaum. Computer Networks, 3rd ed.
- Jim Kurose and Keith Ross. Computer Networks: A Top-Down Approach Featuring the Internet
- Srinivasan Keshav. An Engineering Approach to Computer Networks.

These are good textbooks that may be adequate if you already have a copy. Tanenbaum's book is packed with information; there's plenty in there that I don't know. Kurose's book is new enough that I haven't spent much time with it. Keshav's book is great and has balance between IP and telephone-style networks: balance that this course will not have (so much of the content is not needed).

### 4 Grading

The grading of this course will be based on the following criteria. In this section, I present both the approximate percentage breakdown and a description of the criteria.

#### 4.1 Class participation ( 10% )

I intend to conduct class time mostly in discussion. Being part of the academic community means making well-reasoned arguments about a paper's quality or lack thereof: it helps you get papers you like accepted by program committees and helps you to gain standing by asking insightful questions at workshops and conferences.

If you expect to sit in the corner and not say anything, you will miss out on these points. Do not expect to get an A.

#### 4.2 Presentation (10%)

You and a partner will present one (or perhaps two related) papers in a class meeting in the second half of the semester. The papers should be advanced background for your research project.

If you are not experts in the paper you present, if you cannot justify why it was an excellent paper for the rest of the class to read and discuss, points will be missed.

#### 4.3 Background Homework ( 5% )

I have four homeworks prepared. They cover material that should refresh undergraduate experience or shape self-study. These are mostly to prepare you for exams.

On a homework, if I ask a specific question, provide a specific answer. If it looks like you're paraphrasing a paragraph from wikipedia or a textbook without processing that information enough to understand, even if the answer is embedded somewhere within the long response, I will consider it incorrect. You've been warned.

#### 4.4 Reading-related “Blog” participation and exercises ( 15% )

In my experience, students don’t read papers unless there is some graded exercise involved. However, full “reviews” of papers are too long to be evaluated, focus on minutiae, and encourage harsh evaluation of what are, on the whole, pretty good papers.

Instead we have comments on the blog. One point for a reasonable effort at commenting. Two points for something insightful. The distribution of insightful comments tends to be maybe four per post. That is, very few. You may not get them often.

The papers will be listed at: <https://scriptroute.cs.umd.edu/711s09/>. Please use the comment feature to ask questions or post opinions before class. I hope to accomplish two things with the blog comments. First, for students more comfortable expressing themselves in writing than vocally in class, the blog gives an opportunity to gain the respect of peers without risking class time. Second, I hope that it will support better use of class time by skipping directly to the interesting questions or to points of widespread confusion.

You should be able to subscribe to the RSS feed at: <https://scriptroute.cs.umd.edu/711s09/xml/rss20/feed.xml>. I will use that in lieu of a mailing list when posting new assignments, extending deadlines, etc.

The software is unstable (from a subversion repository) with my own modifications. Please check that your posts are stored. A monster log is kept, so please don’t tell me the blog ate your homework. :)

In the comments, I’m looking for is evidence of significant thought, incorporating personal experience, evaluating the paper in a new way (in light of 20 years after it was written, for example), or criticism (a fatal flaw). Don’t trust authors! Make the authors convince you.

**Good** This paper is awesome because the problem of sprocket wobble affects ordinary users in oceania and eurasia.

**Poor** The authors address sprocket wobble, which they say is a very important problem.

Connections to other research, discussion material in the class, comments by other students, etc.

**Good** This approach violates the end-to-end arguments because it places unnecessary functionality in the network, and it violates the ‘tussles’ argument by choosing an outcome in favor of repressive governments over the interests of ISPs and users.

**Poor** I think this is too complicated and will never be deployed.

Clarity and grammar, with simple points, supported by declarative sentences in active voice. Less is more: think silver bullet, not shotgun. For me, DON’T yell (you might enclose phrases in asterisks instead). Break paragraphs for new ideas.

**Good** This idea is worthwhile, but not for the reasons the authors claim. An operator could use it to plan backhaul upgrades, which they find difficult (Bolot SysChat). Traffic engineering on the backbone network is child’s play.

**Poor** The idea described would be better applied toward backhaul links. Provisioning the capacity of backhaul links is a hard problem.

I want to see that you’re starting down a path that would lead toward new research agendas of your own: finding (big, architectural) limitations, finding new applications of the idea, finding the heart of the problem the paper addresses incompletely, or proposing a new and better technique. It’s very hard to make this jump without thinking about the papers for a while, and it’s pretty hard to explain a new idea in the blog conversation without focusing the post around that new idea.

I know this level of comment won’t always be possible. Do your best.

#### 4.5 Course project ( 25% )

The course project will be a pair research project. Teams of two (and at most one team of three) will work together to construct a research project proposal, structured as a position paper. Details and project ideas will follow in another

handout. The course project grade will consist of, in roughly equal measure: milestones, an oral presentation, and a written report. Milestones will include a one-page abstract describing the project and the expected contribution of each team member, a mid-semester progress report with initial results, a draft introduction, and draft talk slides. I may not have time to review each submitted milestone; I may have to focus on those groups that struggle or those that ask for help. Milestone deadlines will usually fall on Fridays.

Ideally, each group will have members with different skills who can teach each other. Unfortunately for me, I don't know how to encourage group members to teach each other through grading. I expect students will help each other with CVS, L<sup>A</sup>T<sub>E</sub>X, a little writing, a little hacking, and a little theory. If your group is loaded with people having the same narrow skills, change: you will learn more.

#### **4.6 Final exam ( 15% )**

There will be a take-home final. I will be looking for creativity and synthesis, not recall.

#### **4.7 Undergraduate Exam ( 10% )**

In the sixth week of class, I will administer an abridged undergraduate (417) final exam. Understanding the papers we read on your own depends on an understanding of the background material; this milestone is intended to bring everyone up to a comparable level of preparation quickly. The exam is closed book, but may be made open (single) textbook for a 5% deduction (minus 5% of possible points, not minus 5% of earned), and open laptop computer (wikipedia, emacs buffer) for a 15% deduction. This decision is made independently by each student, and can be made after seeing the exam (and deciding whether reference material would help enough).

Guidance: last spring, students who took the 5% deduction for a textbook appeared to have no net increase in score: the book did not help enough to make it worthwhile. No one took the laptop option. Students who failed the exam were given remedial work to raise their grades to a passing level.

### **5 Lateness**

All assignments can be turned in electronically. There will be no late turnins.

There are exceptions for excused absences defined by the university. If you're sick, get a note. If you need accommodation for disability, illness, family emergency, religious observance, etc., ask me *early*.

If you're traveling to a conference and need to know what you'll miss, so that you can get a head start before you leave, ask; I can likely tell you.

### **6 Collaboration**

Reading assignments are to be done individually. Exams are to be done individually. Individually means without collaboration with other students, without asking questions of outsiders, on mailing lists, of senior graduate students, etc. If in doubt, talk to me.

Course projects are to be done in pairs; while I do not expect all group members to be present for all work, I do expect each group member to know what the others are up to. If you split up the work too coarsely (one person writes the report, another gives the presentation, etc.), I will be disappointed. You are welcome to solicit the advice of senior grad students, faculty, friends, family, pets, psychics, and whomever else might help you in your quest. I will get grouchy if I see that you've sent a FAQ to a mailing list, so be careful when you represent UMD publicly.

### **7 Priorities**

It's up to you to decide what's important: why you take this course, what you hope to gain, and where you want to be in a few years. If the course is not meeting your expectations or satisfying your goals, talk to me.

## **8 Spring 2009 Specifics**

I expect a few things to change this semester: enrollment is high (usually under 20) and TA help is absent (the budget). I will not grade every assignment. I will choose somewhat at random which ones I will grade, and will make more of an effort to grade the first week's assignments early.

I am also likely to reuse assignments. Note that consulting solution keys or the assignments as issued in previous semesters will be considered cheating.

## **9 Master's Comps**

CS graduate students: go sign up with Fatima for your Master's comps credit. Even if you don't think you want a Master's (it is very difficult to predict what may get in your way in the next few years). If I'm asked after the semester is over, I will take a long time to answer.