**Syllabus for CPSC 471-01 13326**

**Computer Communications**

**3 Credit Hours**

**FALL 2016**

**Course:** CS-471

Time Section 02: T Th 11:30–12:45 pm

Place: EC 109 - Lecture Hall

Course Website: Titanium

Course Anonymous Feedback: [ssilverman@fullerton.edu](mailto:mgofman@fullerton.edu)

**Instructor: Steven J. Silverman, PhD**

**Course Objectives:** The first long-distance computer communication took place in Septem- ber 1940, when George Stibitz, a founding father of digital computing, used a Teletype ma- chine to send instructions from his Model at Dartmouth College to his Complex Number Calculator in New York and received results back by the same means. Since then, computer communications researchers have pioneered the greatest catalyst of all times: the Internet. The advent of the Internet has sparked the development of smart phones, tablets, netbooks, and numerous other network-driven technologies that have transformed so many facets of our lives.

Contrary to the popular belief, the Internet is not a monolithic structure: rather, it’s a large and complex mosaic of numerous interconnected technologies. Naturally, this raises a question: what are these technologies? How do they work? The purpose of this course is to answer these and other questions.

This course is a journey through the world of computer communications. To prepare for the journey, we introduce the concept of a *protocol*: a set of rules governing communication. We then learn that real-world computer communications require *many* different kinds of protocols. These protocols come together to form a *Protocol Stack*, which can be envisioned as a hierarchy of layers, where each layer houses protocols necessary to perform one of the steps of data delivery. This organization, as we will see, is what makes modern networks scalable and robust.

Our journey will take us through the microcosms that exist at each layer of the protocol stack. We will start from the top of the stack. The first stop of the journey is the *Application Layer*, where live email, HTTP, FTP, SSH, DNS, and many other familiar protocols. These kinds of protocols provide services to applications for effectively communicating with other applications.

The second stop will be the *Transport Layer:* the arbitrator of communications between processes. It’s key functions include ensuring reliable end-to-end delivery of data and con- trolling network congestion. This is the dwelling place of TCP and UDP protocols, that have continually enjoyed wide-spread deployment on the Internet.

We continue on to the *Network Layer*. Its primary function is routing: forwarding data between networks. It is a world of routers, hops, pathways, and other concepts and tech- nologies.

Next, we delve deep into the inner-workings of the *Link Layer*. The Link Layer houses protocols used for communications between two directly connected devices. It’s denizens include the well known Ethernet, ARP, DSL, and many other protocols.

Finally, we arrive at our final destination: the *Physical Layer*. The sole responsibility of the physical layer, is to transform bits of information into electrical signals, radio waves, light pulses, or into whatever the future holds. Before concluding our journey, we will take a short plunge into advanced topics of computer networking: network security and networking in the virtualized world.

Topics covered by this course may include (but not limited to):

*•* Computer Networks and the Internet

*•* Application Layer

*•* Transport Layer

*•* The Network Layer

*•* The Link Layer and LANs

*•* Multimedia Networking

*•* Network Management ( SNMP )

*•* Virtualized Networking

**Book:** Kurose, James F.; Ross, Keith W., *Computer Networking (6th ed.),* Pearson Educa- tion, ISBN-10: 0132856204.

Additional reading materials shall be posted on Titanium.

**Prerequisite:** CPSC 351.

Please note that the Computer Science Department takes prerequisites **very seriously**. If the prerequisites are not met, you may be **dropped administratively**, and with the registration schedule, it may be difficult or impossible to readjust your schedule afterwards. However, please also note that you cannot assume that you will automatically be dropped; if you want to drop a course, you should drop it yourself using Titan Online.

**Course Software:** gcc, g++, Java, and Python were installed on the computers in the computer lab. Virtual machines with appropriate tools will be provided as necessary.

**Slides:** All course materials shall be available on Titanium.

**Assignments:** All assignments shall be posted on Titanium. Assignments shall include both theoretical questions and programming problems. All assignments shall be done individually, unless specified otherwise. Students may use C, C++, Java, Python, or C# unless otherwise

specified. All assignments shall be completed using Titan Server (unless otherwise specified). Instructions for accessing the Titan Server will be distributed in class. Late assignments shall be penalized 10%. No assignment shall be accepted after 24 hours from the deadline. *All assignments shall be submitted through Titanium.*

**Quizzes and Lab Exercises:** Quizzes and lab exercises are designed to reinforce the concepts covered in class. You can think of lab exercises as take-home quizzes. Quiz and lab grades shall be averaged together. The lowest of the grades shall be dropped.

All in-class quizzes shall be *closed book*. The questions will focus on the materials discussed in class. Missed in-class quizzes shall get a grade of 0 (unless you can provide written evidence of a legitimate excuse e.g. doctor’s note). Lab exercises will require critical thinking (and creativity!) in order to solve real world problems. *Late lab exercises shall be penalized 10%. No labs shall be accepted after 24 hours from the deadline.*

**Attendance and participation:** The attendance is mandatory and shall be taken at the beginning of every class. For each attended session, the student shall earn a credit. Missed sessions shall receive 0 credit. *Each student may miss* **one class** *without incurring penalties for attendance*. **Please do not forget to sign the attendance sheet passed at the beginning of each class**. Absences shall only be excused if you provide **written documentation** (e.g. doctor’s note) explaining the reason for the absence.

**Exams:** All examinations are *closed book and cumulative* (unless specified otherwise). Missed exams shall be dealt with according to University policies on incompletes and withdrawals. The tentative schedule for the examinations is given below (please also check with the Final Exam Schedule posted on-line):

*•* Midterm (Tentative):

**–** : 10/15/2015 (In class).

**\_ :** 11/15/2015 ( take home in part , ½ in class, ½ at home )

*•* Final Exam:

**–**: 12/?/2015.

TBD

same room as lecture.

**Course Grades:** The course grade shall be curved over an entire class. The course grades shall be (**STRICTLY**) assigned according to the following ranges:

|  |  |  |
| --- | --- | --- |
| A+: *≥* 95% | A: *≥* 92% | A-: *≥* 90% |
| B+: *≥* 88% | B: *≥* 82% | B-: *≥* 80% |
| C+: *≥* 78% | C: *≥* 72% | C-: *≥* 70% |
| D+: *≥* 68% | D: *≥* 62% | D-: *≥* 60% |

The course grade shall comprise:

Assignments: 25% (around 4-6 Assignments) Lab Exercises 25% (may drop 1 lowest) Attendance and participation: 3% (may miss 1 class) Midterm: 22%

Final Exam 25%

Same grading scheme shall be used for both graduate and undergraduate students. Graduate students, however, should expect more challenging questions on assignments, quizzes, and exams.

The grade for each category (e.g. assignments, quizzes, etc) shall be an average of it’s constituents. The course grade shall be computed as weighted mean of all categories. For example, suppose that John Doe has earned the following grades:

*•* Assignments:

|  |  |  |
| --- | --- | --- |
| **–** | Assignment 1: | 100/100 |
| **–** | Assignment 2: | 70/100 |
| **–** | Assignment 3: | 80/100 |
| **–** | Assignment 4: | 50/100 |

*•* Quizzes and Lab Exercises:

|  |  |
| --- | --- |
| **–** | 50/100 |
| **–** | 90/100 |
| **–** | 80/100 |
| **–** | 100/100 |

*•* Midterm: 70/100

*•* Final Exam: 50/100

*•* Attendance: 100/100

The grade is computed is as follows:

*•* Assignment average: (100+70+80+50)/4 = 75

*•* Quiz/Lab average: (90+100+80) / 3 = 90 (lowest grade has been dropped).

*•* Attendance: 100

*•* Midterm: 70

*•* Final Exam: 50

*•* Attendance: 100

Next, we compute the weighted mean of the above grades:

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Category Average | Category Weight | Result |
| Assignments | 75/100 | 25 | (75/100) \* 25 = 18.75 |
| Quizzes/Labs | 90/100 | 25 | (90/100) \* 25 = 22.5 |
| Midterm | 70/100 | 22 | (70/100) \* 22 = 15.4 |
| Final Exam  May 19 | 50/100 | 25 | (50/100) \* 25 = 12.5 |
| Attendance | 100/100 | 3 | (100/100) \* 3 = 3 |
| Sum: (18.75 + 22.5 + 15.4 + 12.5 + 3) = 72.15 | | | |

Hence, John’s raw score is 72.15. This grade shall then be curved according to the perfor- mance of the entire class. The amount of curving depends on the overall performance of the

entire class. The curving cannot cause the raw score to decrease. Please feel free to use the grade calculator worksheet found on Titanium (gradecalcCS471.xlsx). It will help you to better understand the grading process, and will enable you to forecast your raw scores (simply replace weights and grades with courses weights and your grades, respectively).

If you have questions about the grading of assignments, quizzes, or exams, please contact the instructor.

**Extra Credit:** Assignments, exams, and quizzes may include bonus sections. No other forms of extra credit shall be granted.

**Class Cancellation Policy:** All class cancellations shall be announced by email. If the instructor does not arrive within the first 15 minutes of the class, you may assume the class is canceled.

**Academic Honesty:** All forms of cheating shall be treated with utmost seriousness. You may discuss the problems with other students, however, you must write your **OWN codes and solutions**. Discussing solutions to the problem is **NOT** acceptable (unless specified otherwise). Copying an assignment from another student or allowing another student to copy your work **may lead to an automatic F for this course**. Moss shall be used to detect plagiarism in programming assignments. If you have any questions about whether an act of collaboration may be treated as academic dishonesty, please consult the instructor before you collaborate. Details posted at [http://www.fullerton.edu/senate/documents/PDF/300/](http://www.fullerton.edu/senate/documents/PDF/300/UPS300-021.pdf)UPS300-

[021.pdf.](http://www.fullerton.edu/senate/documents/PDF/300/UPS300-021.pdf)

**Emergency Policy:** Please familiarize yourself with the actions to take in case of an emergency. The information can be found at [http://prepare.fullerton.edu/.](http://prepare.fullerton.edu/)

**Disabled Student Services:** Information for students with disabilities can be found at:

<http://www.fullerton.edu/DSS/>

**Approximate Schedule (subject to change):**

|  |  |  |
| --- | --- | --- |
| **Week** | **Lecture Topic** | **Reading** |
| Week 1 | Class Logistics and Introduction | Course Syllabus, Kurose 1 |
| Week 2 | Computer Networks and the In-  ternet | Kurose 2 |
| Week 3 | Application Layer | Kurose 2 |
| Week 4 | Application Layer | Kurose 2 |
| Week 5 | Transport Layer | Kurose 3 |
| Week 6 | Transport Layer | Kurose 3 |
| Week 7 | Transport Layer | Kurose 3 |
| Week 8 | The Network Layer | Kurose 4 |
| Week 9 | Midterm Exam and the Network  Layer | Kurose 4 |
| Week 10 | Spring Break |  |
| Week 11 | The Network Layer | Kurose 4 |
| Week 12 | The Link Layer and LANs | Kurose 5 |
| Week 13 | The Link Layer and LANs | Kurose 5 |
| Week 14 | The Link Layer and LANs | Kurose 5 |
| Week 15 | SNMP |  |
| Week 16 | SNMP |  |