Computer Networks and Programming (ECE 5650)

Winter 2016

Syllabus

M W  3:30 PM – 5:20 PM  09/02/15 - 12/22/15  2409  ENGG

Title: Computer Networking and Programming for Engineers Cr. 4 (LCT: 4)

Course Description:
Prereq: ECE 4050 or CSC 5050 or consent of instructor; junior standing or above.
Fundamentals of network services and architectures, TCP/IP protocols, media access control,
wireless access, network programming, and other topics. Programming assignments give
students hands-on experience

Course Meeting Time: M W 3:30 PM – 5:20 PM

Course Meeting Location: 2409  ENGG

Instructor:
Name: Dr. Nabil J. Sarhan
Office Hours: Monday and Wednesday 11:30 AM – 1:00 PM
Office Location: 3109 Engineering Building
Phone: (313) 577-2860
Email: nabil@ece.eng.wayne.edu

Teaching Assistant:
Name: Sina Gholamnejad Davani
Office Hours: Monday 5:30 – 6:30 PM and Thursday 3:00 – 4:30 PM
Office Location: 3352 ENGG (Multimedia Computing and Networking Lab)
Phone: (313)577-1956
E-mail: sina@wayne.edu

Course Homepage: You are responsible for all announcements on the course homepage on
Blackboard.

Goals: To develop understanding of the underlying concepts and technologies of the Internet as
well as Internet applications architecture with a five-layered model approach: application,
transport, network, link, and physical layers. To prepare students for practical IT work
environments, where the Internet is the cornerstone of software development.

Learning Objectives: After completing this course, students should be able to do the following:

1. Explain and compare the services provided by the application, transport, network,
link, and physical layers of the Internet stack.
2. Explain how packet-switching works and identify the different types of packet delay
3. Describe the essential principles of a transport layer protocol, including reliable data transfer, flow control, and congestion control.
4. Explain the principles behind network layer services and demonstrate the operations of the major routing algorithms/protocols.
5. Explain the principles behind link layer services and compare various multiple access techniques.
6. Develop network applications using socket programming.
7. Use a networking tool (such as Wireshark) to observe and analyze the behavior of networking protocols.


Reference: none

Prerequisites by Topic: ECE 4050 or consent of instructor; junior standing or above.

Corequisites by Topic: none

Topics:

- Overview: Computer Networks and the Internet: the Internet, the Network Core, Network Access and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models.
- Link Layer: Data Link Layer Services, Error Detection and Correction Techniques, Multiple Access Protocols, LAN Addresses and ARP, Ethernet, Switches
- Wireless and Mobile Networks: Introduction to Wireless and Mobility, Wi-Fi, Mobility Principles, Cellular Telephony and Mobile IP.

Course Structure: The class meets for two lectures a week. Three classes will be held in the lab during regular class time.

Computer Resources: PCs and Sun Solaris Workstations.

Laboratory Resources: The laboratories contain PC and Linux workstations.

Laboratory Policy: There is absolutely no smoking; eating or drinking in any ECE instructional lab. These labs must be kept neat and each student is responsible for insuring that the equipment on his/her workbench is neatly arranged, that all the leads and other equipment are put away,
and that there are no scraps of paper or other garbage left on or near his/her work station. Coats, briefcases: Knapsacks and other personal belongings are not permitted on or near the benches. These items must be kept on the coat rack near the door, not on the benches, window sills or the floor near the benches. The door to the lab must be kept locked at all times; unlocking or propping open the door at any time is expressly forbidden. Guests are not permitted in the lab at any time, and no one but the instructor may open the door to admit anyone after the class has begun. (For further laboratory policies, please look at the laboratory manual.)

Distribution of Points:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam I</td>
<td>23%</td>
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<tr>
<td>Exam II</td>
<td>22%</td>
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<tr>
<td>3 Projects</td>
<td>30%</td>
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<td>2 Lab Assignments</td>
<td>10%</td>
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<tr>
<td>Introductory Programming Assignment</td>
<td>3%</td>
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<tr>
<td>Personal Info. Page Assignment</td>
<td>2%</td>
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<tr>
<td>Technology Update Presentations</td>
<td>5%</td>
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<tr>
<td>Attendance</td>
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Instructor may give extra credit for outstanding attendance and class participation, outstanding improvement in Exam I, and outstanding performance on both exams.

Grade Breakdown:

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<td>85-89</td>
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Attendance:

Every student is expected to attend all lectures. Attendance will be taken at the very beginning of some selected lectures. If you are late, your name will NOT be recorded.

Exams:

- Exam I be scheduled based on the class progress and will be announced at least one week in advance.
- Exam II is scheduled for Monday, April 25 during the normal class time in the regular classroom. You must let me know during the first week of classes if you have a conflict with another exam or you have exam overload. Exam II is not cumulative.
- Do NOT assume that you will be able to take a makeup exam. Regardless of your circumstances, approval to take a makeup exam is up to the instructor.
- All exams are closed book and closed notes.
- Calculators that can store notes are NO allowed.
- Flagrant cheating on an exam or a quiz will result in, at minimum, a failing grade for the course.

All Assignments, Including Labs and Projects

- All assignments will be posted on the course homepage.
- Assignments must represent your original work.
  - Most assignments must be done individually or with one other student.
  - If you are allowed to work with one student and you decide to do so, you must submit only one solution with both names.
  - You must not look at other solutions or show your solutions to anyone else.
  - You must not collaborate or discuss the assignment with other groups or individuals.
  - You must not get any portion of the code from Internet sources, other current or prior students, or other groups or individuals.
  - You must not ask or pay others to help you with the solution.
  - If you are allowed to work with one student and you decide to do so, you must make sure that your partner adheres to the aforementioned rules and you must notify the instructor immediately if you suspect any wrongdoing.
  - If you are allowed to work with one student and you decide to do so, you must make sure that the submitted solution includes both your significant contributions.
  - All solutions will be checked for plagiarism and compared with all prior solutions and with Internet sources.
  - At minimum, duplicate or very similar assignments will receive NEGATIVE grades.
• Save all intermediate work until an assignment has been graded, returned and recorded. Keep the final source versions of your programs. Make frequent backups of your work. Never let anyone else use your account.
• All questions on grading must be brought to my attention within one week of the assignment's return.
• You are welcome to ask any questions with regard to the assignments after class or during office hours. You do NOT have to have an appointment to come to the office hours.
• **You should always start working on the assignments as soon they are announced** even if they seem to be easy for you. You may run into unexpected problems that you may not be able to solve on your own when it is too late for you to ask for help.

**Late-Submission Policy:**

• All assignments, including projects, are officially due by the start of class on the due date.
• **Late assignments will NOT be accepted.** The following excuses will NOT be approved for late submissions: computer crashes, disk crashes, accidental file deletions, lab computer unavailability, forgetting to print out the checklist and/or the output, printer problems, and the like.
• **You are strongly encouraged to turn in the assignments in the class before the deadline to account for any unpredictable situations.** You must always work ahead and make backups to account for unexpected problems.

**Personal Information Page Assignment:**

• **Deadline: Friday, January 22 by 11:59 PM.** No late submissions will be accepted.
• **Instructions:** Create your homepage on the ECE5650 Blackboard Page. Your homepage must include at least your full name, *picture*, the nickname (if any) you like to be called in the class, major, degree sought, years at WSU, and the expected date of graduation.
• **Procedure:**
  1. From the ECE 5650 Blackboard Webpage, select Blogs and then select the student personal info blog.
  2. Create a new blog entry with your full name as the title and then include your personal info in the message box. *The personal info must include at least your full name, nickname (if any), major, degree sought, department, years at WSU, and the expected date of graduation.*
  3. Attach a picture of yourself and hit the submit button.
  4. After creating the blog entry with your picture and info, go the "Personal Info Assignment" page and enter "I created a blog entry with my picture and required personal info" in the Assignment Materials Submission" page and then hit the "Submit" button.
5. **To verify your submission**, go to Grade Center and make sure that you have "!" under this assignment's column. This means that the assignment is submitted and awaiting grading.

**Technology Update Presentations:**

- Each student is required to give an in-class Power-Point presentation about a new, interesting, and related topic or technology.
- It must be formatted professionally and must include graphics.
- The details will be posted on the assignment page.

**Outcome Coverage:**

(a) an ability to apply math, science and engineering knowledge. The students will know how to solve problems involving computing the communication delay and analyzing the effectiveness of proxy caching.

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. The design projects will conform to the specifications and standard protocols.

(e) an ability to identify, formulate and solve engineering problems. Students must be able to develop efficient network applications under practical limits.

(f) an understanding of professional and ethical responsibility. Students will know the necessity of not misusing or abusing the knowledge gained in the class.

(g) an ability to communicate effectively. The student will make professional presentations in the class and write professional reports.

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. The course details the design of the public Internet and how engineering solutions evolved to meet global, economic, environmental, and societal needs.

(j) a knowledge of contemporary issues. The students will become familiar with contemporary issues involving the Internet and network protocols.

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. Students will learn how to use a software tool (such as Wireshark) and the Python programming language to build network applications.
Religious Holidays (from the online Academic Calendar):

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:

(Edited statement from the SDS website): If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Academic Dishonesty (Plagiarism and Cheating):

(Edited statement from the DOSO's web site): Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.
- Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.
• Plagiarism: To take and use another’s words or ideas as one’s own. Examples include (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

• Other forms of academic misbehavior include, but are not limited to (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

Course Drops and Withdrawals:

In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at http://reg.wayne.edu/pdf-policies/students.pdf.

Student services:

The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit www.success.wayne.edu for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit http://clasweb.clas.wayne.edu/writing to obtain information on tutors, appointments, and the type of help they can provide.

Prepared by Dr. Nabil J. Sarhan, Associate Professor of Electrical and Computer Engineering

Last Revised: January 11, 2016