Networks and Data Communication
CS 447-001 (CRN: 15717) - Spring 2016

Welcome to CS 447!

Instructor: Dr. Hiroshi Fujinoki
Office: EB 2034
Email: hfujino@siue.edu
URL: www.siue.edu/~hfujino
Office Phone: 650-3727
Office Hours: Monday: 10:00 A.M.-12:00 P.M. and 1:30-3:30 P.M.
    Tuesday: 1:30-3:30 P.M.
    Wednesday: 10:00 A.M.-12:00 P.M. and 1:30-3:30 P.M.
    Thursday: no office hour (due to Fujinoki's committee meetings)
    Friday: Only by Appointment: please make an appointment 24 hours
    prior to the time you want to meet the instructor.

Note: The above office hour schedules do not apply to the final exam week and the
week before the final exam week.

Class Meeting Room: EB-0140
Class Meeting Days: T and R
Class Meeting Time: 9:30 A.M. - 11:45 A.M. (for both T and R lectures)

Note: item with "★" symbol means an important item.

★ Course Prerequisites:
    CS340 (Data Structure and Algorithms), CS312 (Computer Organization), and CS314
    (Operating Systems), or the instructor's permission. If you have not taken these
courses, please talk to the instructor.

★ Course Objectives:
    This class is an undergraduate level introduction to computer networks. There are
three objectives in this course. The first objective is to acquire fundamental
knowledge about underlying mechanisms in modern computer networks. The second
objective is to become proficient in essential network programming techniques such as
sockets using TCP/IP and HTML protocols through programming projects. The third
objective is to be familiar with theoretical methods to analyze system performance of
various aspects of modern computer networks. Since this course is an introductory course, much emphasis will be put in the first two objectives. By the end of the semester, students are expected to be proficient in networking programming with an insight to the underlying network mechanism.

<table>
<thead>
<tr>
<th>Grading:</th>
<th>Weight:</th>
<th>Final Letter Grade:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes:</td>
<td>20%</td>
<td>100-92: A</td>
</tr>
<tr>
<td>Programming projects</td>
<td>20%</td>
<td>91-82: B</td>
</tr>
<tr>
<td>Midterm Exam:</td>
<td>25%</td>
<td>81-72: C</td>
</tr>
<tr>
<td>Final Exam:</td>
<td>35%</td>
<td>71-60: D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Below 60: F</td>
</tr>
</tbody>
</table>

Different final letter grade standard will be applied to under-graduate students.

Exams:
- Exams will be closed textbook and closed notes.
- Absence without a prior consent from Dr. Fujinoki will result in zero point.
- If you need any special assistance you must contact to Dr. Fujinoki at least one week before (since a makeup needs to be arranged).
- The same rules are applied to the quizzes.
- A calculator is allowed in the exams (however sharing a calculator during an exam is NOT allowed - everyone needs to bring your own calculator).

Course Projects:
- The course project is split into two different phases. The description of the two phases are:
  - **Phase 1:** Develop client/server prototype using socket. The main purpose of this phase is for you to be familiar with all the basics in socket programming. We are going to use Winsock for Win32 environment.
  - **Phase 2:** TBA (the second project may be split to two (or possibly more) sub-phases).

Quizzes:
- There will be 12 quizzes during this course. The quizzes are closed textbook, notebooks and neighbors (you are allowed to use your pens, pencils, blank papers, eraser(s) and a calculator during a quiz). A list of possible questions for each quiz will be posted in the course home page at the end of the week before each quiz (usually on Friday). The questions will appear as posted in
the list in the actual quizzes (parameters may be modified for some questions).

**Attendance Policy:**
- Attendance will be taken at the beginning of lectures (being late more than 5 minutes may be considered absence).
- For each absence after the third absence, -3 point penalty will be applied to your next exam grade (each such absence before the midterm, the penalty will be applied to your midterm exam and for those after the midterm, the penalty will be applied to the final exam).
- The above penalty will not apply to medical emergency (however, you need to provide written proof of medical service to waive the penalty).
- To waive penalty for missing a lecture for any reason other than medical emergency, you need to have a prior agreement with the instructor (however, you must have a very good reason).

**Academic Dishonesty:**
Following activities will be considered academic dishonesty and final letter grade of F can be given:
- Submitting work (such as homework assignments and projects) done by somebody else (this includes any human/electronic sources (such as websites)).
- Watching and copying your neighbors' solutions during quizzes and/or exams.
- Using materials not allowed during quizzes and exams.
- Using materials not allowed for the programming projects.

**Required Textbook:** The course materials are presented using PPT slides in this course, but they are the summaries of the chapters/sections in a required textbook.

**Recommended Reference Book (for project):**
- Arthur Dumas, “Programming Winsock/Book and Disk”, SAMS Publishing (ASIN: 0672305941)
Other Required Skills/Knowledge:
- Experience with C/C++ (MS .NET or MS VC++)
- Knowledge of modern operating systems

Other Notices:
- Every student is expected to check "Class Notices" in CS447-001 home (follow the link from within “http://www.siue.edu/~hfujino”) at least twice in a week. Important notices for that week will be posted on Sunday night. I assume each of you check the homepage on Sunday night.
- The instructor is NOT responsible for the consequences if you do not regularly check the CS447 home. Information regarding important activities, such as exams and projects, will be posted at least 24 hours prior to the deadline unless otherwise announced (this means if posting any important information is announced in the classroom, it can appear in the CS447 home even within 24 hours from the deadlines).

Disability Support:
- Students who believe they may need accommodations in this class are encouraged to contact the office of Disability Support Services as soon as possible. It is the students' responsibility to alert the instructor to SIUE sanctioned accommodations. If anyone needs assistance from SIUE Disability Support Services, please contact them.

Tentative Class Schedule (subject to change):
This schedule is tentative and subject to change.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Day</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>January 12 (T): Course Introduction, circuit-switching and packet-switching networks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>January 14 (R): Local-area-network (LAN), Wide-Area-Network (WAN), the Internet and intra-net Network Protocols and OSI 7-layer model</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>January 19 (T): Quiz #1, Project Phase 1 description (1), socket Programming Tutorial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Client-server architecture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IP address and TCP port number</td>
</tr>
<tr>
<td></td>
<td>January 21 (R): Project Phase 1 description (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project #1 Assigned</td>
</tr>
<tr>
<td>Week 3</td>
<td>January 26 (T): Quiz #2, Circuit-switching and packet switching networks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>January 28 (R): TCP error and flow control (Stop-and-Wait ARQ)</td>
<td></td>
</tr>
</tbody>
</table>
Week 4: February 2 (T): Quiz #3, TCP error and flow control (Selective-Reject & GBN ARQs)
   February 4 (R): Internet architecture (IP address structure)
                  Domain address, host address, CIDR-IP address

Week 5: February 9 (T): Quiz #4, Layer-2 and 3 switches
   Project #1 Due
   February 11 (R): Local Area Networks
                  Bus, ring and star LAN, Repeaters, bridges and routers
                  MAC address, IP address, and host name translation (DNS and ARP)

Week 6: February 16 (T): Quiz #5, Dijkstra and Bellman-ford algorithms, distance-vector routing protocol
   February 18 (R): Transmission Control Protocol (TCP) and TCP-slow start linear-growth flow-control

Week 7: February 23 (T): Quiz #6, Ethernet Essential: CSMA/CD and binary back-off, one-persistent, and p-persistent
   February 25 (R): Switch architecture (TDM switch, cross-bar switch and knockout switches),
                   concept of blocking and non-blocking switches

Week 8: March 1 (T): Internet routing (1)
   March 3 (R): Midterm Exam

Week 9: March 8 (T): Spring Break (no lecture)
   March 10 (R): Spring Break (no lecture)

Week 10: March 15 (T): Project Phase 2 description, HTTP protocol and web server design (using multi-thread)
           Project #2 Assigned
   March 17 (R): Internet routing (2)

Week 11: March 22 (T): Multimedia Support: QoS Control and DiffServ (1)
   March 24 (R): Quiz #7, Multimedia Support: QoS Control and DiffServ (2)

Week 12: March 29 (T): Wireless and cellular networks (1)
   March 31 (R): Quiz #8, Wireless and cellular networks (2)

Week 13: April 5 (T): Cloud computing: concept, implementation, and concerns
   April 7 (R): Quiz #9, Network Security (1)

Week 14: April 12 (T): Network Security (2)
   April 14 (R): Quiz #10, Hardware-based error controls: bit-errors, parity and CRC error detection

Week 15: April 19 (T): synchronous and asynchronous signal transmissions
Project #2 Due
April 21 (R): Quiz #11, time-division and frequency-division multiplexing

Week 16: April 26 (T): Topics TBA
April 28 (R): Quiz #12, Topics TBA

Week 17: Final Exam Week
May 5 (Thursday) at 8:00-9:40 A.M.: Final Exam (comprehensive)

- The list of the reading assignment is the minimum requirement. It is expected that each student voluntarily studies not only the required sections but other related sections or materials.
- Required reading should be done before the lecture.
- If you have any problem for the above schedule, please contact to Dr. Fujinoki as soon as possible.
- Any question regarding this syllabus should be addressed to: hfujino@siue.edu