CSUS
COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
Department of Computer Science

C Sc 255 - Computer Networks, Fall 2013 (MW 4-5:15p; Shasta 145)
INSTRUCTOR:  Isaac Ghansah
Office: RVR (ECS)-4004; Phone:278-7659; Email: ghansah@csus.edu ;
WWW: http://gaia.ecs.csus.edu/~ghansahi/ ; (DATED!)
Office Hours: MW 515-545, TU 1-3; and other times by appointment

COURSE DESCRIPTION:
Computer networking fundamentals with emphasis on higher level protocols and functions. Course contents include network design considerations, software design and layering concepts, interface design, routing and congestion control algorithms, internetworking, transport protocol design, end-to-end communication, session and application protocols. Specific examples of commercial and international standards are cited.

Prerequisite: C Sc/CPE 138, or Fully Classified Graduate Standing in CSC, CPE, or SE, or permission of instructor.

Prerequisite Proof:
The Computer Science Department has a policy that each instructor will verify the student transcript and ascertain that the student has the prerequisites. You can log on to My Sac State go to "Student Center" and select "Unofficial Transcripts" to print. You also can select and print "Transfer Credit Report" if you have transferred from another institution. You must submit your transcript for verification. Any student who has completed one or more prerequisites at another school must provide similar verification to the instructor. Any student who has not submitted their transcript by the end of the second week will be dropped from the class.

Repeat Policy:
The department has a policy specifying that students may not repeat a Computer Science course more than once. Any student who wishes to repeat a course more than once (that is, take a course for a third time) must submit a petition requesting permission to do so. Student records will be reviewed to determine whether a student is taking this course for three or more times. Any such student must return an approved petition to the instructor within the first two weeks of class. Any student who does not submit an approved petition will be dropped from the class. Petitions are available in the Department office (RVR 3018) and require the signature of both the Instructor and the Dept. Chair.

TEXTBOOK:

1. Ghansah I., C Sc 255 Class Notes, 2013 Online (required) – TBA


**REFERENCES:**
3. Stevens, W., *TCP/IP Illustrated, Vols 1, 2, & 3*, 1996, Addison Wesley
7. Stallings, W., *High Speed Networks and Internets, 2Ed* 2002 Prentice Hall
10. Research papers

**GOALS:**
1. To provide the student with understanding of Higher Level Protocols and Functions of Computer Networks especially TCP/IP Architecture and companion protocols.
2. To provide depth of knowledge of commercially available wide area networks.
3. To develop proficiency in access and use of current literature in the area.

**Prerequisites by Topic:**
1. The TCP/IP Architecture model
2. Data communications of the physical and data link layers

**Expected Learning Outcomes:**
*At the end of this course you should be able to:*
1. Explain the service provided by IP to upper layers and the specific functions performed to provide the service
2. Explain the service provided by TCP to upper layers and the specific functions performed to provide the service
3. Identify different methods that can be used to implement congestion control at both the network and transport (TCP) layers.
4. Calculate performance measures for error and flow control protocols.
5. Compare different routing algorithms
8. Differentiate between IPv4 and IPv6 in detail.
9. Distinguish between IP companion protocols such as ICMP, ARP, RARP, BOOTP, DHCP
10. Know the details of TCP including its limitations and how to improve on those limitations.
11. Understand IP and its design concepts including fragmentation and re-assembly.
12. Distinguish between the switching schemes: virtual circuit, datagrams, cell switching; their advantages and disadvantages; and how they are implemented.
13. Distinguish between routing algorithms that are used in the Network Layer.
15. Understand MPLS, its purpose and advantages.
16. Understand all the issues involved with designing transport layer (i.e. flow control, error control, connection management, etc.) including timers and quantification of performance.
17. Understand quality of service and security issues of the networks.
18. Understand Voice and Data Networks including Wireless, Mobility, end-to-end information delivery, and different Generations of Mobile Networks

**GRADING POLICY:**

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>25%</td>
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<tr>
<td>Final</td>
<td>35%</td>
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<tr>
<td>Assignments</td>
<td>15%</td>
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<tr>
<td>Project/oral and written communication</td>
<td>20%</td>
</tr>
<tr>
<td>Attendance to oral presentations</td>
<td>5%</td>
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**Grading Breakdown (%):**

- A = 93-100
- A- = 90-92
- B+ = 87-89
- B = 83-86
- B- = 80-82
- C+ = 77-79
- C = 73-76
- C- = 70-72
- D+ = 67-69
- D = 63-66
- D- = 60-62
- F = 59 or below

You are required to keep backup (machine-readable) copies of all submitted work, and also to keep all returned (graded) work, until after final grades are posted.

**COURSE POLICIES:**

1. Information in this syllabus is subject to change with notice.
2. Attendance to class and frequent check of email is expected. Class roll will not be checked after first week of classes. However, you are responsible for material presented and announcements made in class or by email. This could include changes to the syllabus, exam dates, etc.
3. Late assignment/project will be penalized by 20% if one lecture late. Nothing will be accepted if more than one lecture late, or if solution has been posted.
4. Make-up exams will only be given under extreme circumstances. The instructor reserves the right to reject make-up requests.
5. Be aware of the school’s policy on drops, incomplete, repeats, and ethics/academic honesty.

**ETHICS/ACADEMIC HONESTY**

Any work submitted is a contractual obligation that the work is the student’s and for which he/she could be quizzed in detail. Discussion among students in assignments and projects is part of the educational process and is encouraged. No discussion among students is allowed in any exams/quizzes. However, each student must make an effort to do his/her own work in all assignments and exams. No type of plagiarism will be tolerated except in the case of group work.
In that case each student should indicate the part of the work, which was their major responsibility in their final joint submission. Nevertheless, I emphasize any work submitted is a contractual obligation that the work is the student’s and for which he/she could be quizzed in detail. The minimum penalty for even a single incident of cheating brought to the attention of the instructor in this course is automatic failure of the course; additional more severe penalties may also be applied. Note that cheating is grounds for dismissal from the University.

Please refer to the Computer Science Dept. document entitled “Policy on Academic Integrity” (available online via the Computer Science department, www.ecs.csus.edu/csc home page) and to the University Policy Manual section on Academic Honesty (all available online via the instructor’s home page) for additional information. IT IS THE RESPONSIBILITY OF EACH STUDENT TO BE FAMILIAR WITH, AND TO COMPLY WITH, THE POLICIES STATED IN THESE DOCUMENTS. In addition, unless otherwise stated, the use of the following devices during exams/quizzes is prohibited: cell phones, pagers, laptops, and PDAs.

ADVICE on WORKLOAD and CLASS NOTES:

There are a lot of reading assignments. You should endeavor to read the assigned pages before coming to class. There will also be homework assignments to be handed in. In addition, you will be required to complete an independent project, which is worth a considerable fraction of your grade for the course.

The class notes are online and should be considered as a guide. Many parts of it are not detailed enough to be self-contained. In addition, experience shows that new material is added every semester. Therefore, attendance to class is necessary in order to understand the details.

INDEPENDENT PROJECT/ORAL AND WRITTEN COMMUNICATION

Independent student projects involving programming (ie. simulation or implementation), or research paper. A list of possible projects are provided by the instructor. Students may choose their own topics upon approval of instructor. Joint programming projects are encouraged. Oral and written communication skills are essential for any work environment you find yourself. Therefore, the deliverables for the projects will include a detailed report and oral presentation report and/or demonstration. The grading will verify your written and/oral communication skills. For details of the specific grading criteria see details of Independent Project call for proposals.

COMPUTER ACCOUNTS AND ELECTRONIC COMMUNICATION:

a) gaia account

You should obtain a UNIX account on the ECS system "gaia" for this class if you do not have one. Though not required you might find it useful for some assignments. These are the steps:

a. Use your favorite Browser and Go to www.ecs.csus.edu
b. Click on Computing Services -> Network Accounts -> Get a new Account.
c. Fill out all required fields

You can also obtain an account by getting one from the College IT staff in room 2011.

b) Mailing List

I have established a Mailing List for this course with a web-based mailist interface called Mailman. It is MANDATORY for every student accepted into the course to subscribe to the
Mailing List within the first two weeks of classes. The list will be used to facilitate electronic communication for the course. Failure to subscribe to the list in a timely manner could result in your missing important assignments, clarifications, announcements, etc that are sent by email. You must check email on a regular basis and I will assume that you have received and read all messages I send to the list. The instructor will not be held responsible for your failures. To subscribe to the list go to the following website and fill out appropriate forms there. PLEASE MAKE SURE YOU FILL IN YOUR FULL NAME IN THE SECTION PROVIDED ON THE FORM.

http://hera.ecs.csus.edu/mailman/listinfo/csc255

This will add your email address (the one from which you send the message, hopefully gaia) to the csc255 mailing list. Subsequently you can send questions or discussion items regarding topics in csc255 to everyone on the list. To do this, just send an email message to the address “csc255@ecs.csus.edu”. This is a good way to send messages to other students in the class regarding clarifications about assignments, lecture, etc. Note that these email messages are sent to everyone on the csc255 list (including the instructors). If you need to communicate privately with the Instructor, use the instructor’s individual email address as given above. Note: Do not send HTML email to the list. Some mail reader programs do not understand HTML Tags.

c) Assignment/Homework Submission
You must submit all homework/assignments/project reports electronically via SacCT (formerly WebCT), which can be reached from mySacState ( my.csus.edu ) or Online.csus.edu. I will not accept a hardcopy. Any file which is placed in WebCT will be named according to one of the formats below (depending on the type of assignment). Please do NOT submit pdf files as I will not be able to make comments on them. Word format is preferable.

Your-name_course#_hmwk_hmwk#, your-name_course#_lab_lab#, your-name_course_project_project#

For example if a student named John Doe is submitting homework#1 the file name of the email attachment should be doe-john_255_hmwk_1

Please note: If the attachment is not according to proper format as stated above, it will not be accepted.
### C Sc 255 - Tentative Schedule Subject to Change

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPICS</th>
<th>READING</th>
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<pre><code>  | (Focus 2.2, 2.3, 2.7)                                                                                                                                         |          |
</code></pre>
<p>| 4-5  | Advanced Networking. BGP, IPv6, ICMPv6, MPLS, Multicast. etc                                                                                                                                           | Ch. 4     |
| 7    | MIDTERM                                                                                                                                                                                              |          |
| 9    | Supervisory Control Data Acquisition (SCADA) System Architecture and Communication Protocols                                                                                                          | Notes    |
| 11   | Multimedia Networking                                                                                                                                                                                | Ch 7. Notes |
| 12   | Network Security concepts, including secure protocols, IPSec, VPNs, VoIP security etc.                                                                                                               | Ch. 8     |
| 13   | Application Layer Protocols –HTTP, DNS, etc. Web Proxies, Performance Issues. Content Delivery Networks Advanced topics as time permits – VoIP, Peer-to-peer and Overlay networks. Distributed Hash Tables. | Ch. 9     |
| 14-15| Independent Project Presentations                                                                                                                                                    |          |</p>

**IMPORTANT DATES:**
Veterans’ Holiday: Nov 11, 2013  
Thanksgiving Break: Nov 28-29, 2013;  
Last Day of Instruction: Dec 13, 2013  
FINAL EXAM: