CS 5143
Network Design and Management

Instructor: Dr. Mohammed Atiquzzaman
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Office Hours: Mondays and Wednesdays 10 - 11 AM and by appointment

Time and Location: M W: 4:30 – 5:45 pm, Carson 119

Course Web Address: Course material will be delivered through https://canvas.ou.edu/

Course Description
This course covers basic concepts of designing networks using analytical and modeling techniques, and network management protocols.

Course Focus
This course focuses on the design aspects of computer networks. It will consider the design of network parameters that affect network Quality of Service parameters such as throughput, packet loss, delay and jitter. It emphasizes on individual projects and class presentations.

Prerequisite
CS 4133 or CS 5133, or equivalent.

Texts and References
• Data Networks by Dimitri Bertsekas, Prentice Hall, 1992.
• Additional references and handouts as required will be provided by the instructor.

Topics to be covered
• Poisson Process
• Various queuing disciplines, e.g. MM/1, M/M/c, FIFO, etc.
• Queue with discouragement, queues with dependence on state of system,
• Little’s theorem,
• Markov chains and applications
• Packet switching network and performance analysis: open and closed loop queuing networks, application of product form solution to the analysis of packet switched networks
• Modeling and analysis of circuit switched networks
  o ATM switch performance
  o Analysis of switches with non uniform traffic (hot spots)
• Buffer Management
  o RED and variants
  o Early Packet Discard
  o Explicit Congestion Notification
• Modeling of computer network protocols
• Network Management
  o SNMP, MIB, RMON
• Advanced Topics

**Student Contributions**
Each student is expected to spend at least 6 hours per week preparing for class. Lecture attendance is crucial in this class. Each student will take a midterm exam and a comprehensive final exam, as well as homeworks, projects and presentation. Working together on out-of-class assignments is encouraged, but all submitted work must reflect each student's understanding, and all documents including programs must be developed independently. Assignments are due at the beginning of class.

**Course Evaluation**
Exams, projects and homeworks will be used to assess each student's progress towards meeting the stated course goals. The following points will result in at least the letter grade specified: A=90 - 100, B=80 - <90, C=70 - <80. The points will be distributed as follows:

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<tr>
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<th>Points</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>25</td>
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<td>Projects</td>
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<tr>
<td>Homeworks</td>
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<td>Final Exam</td>
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**Students with Disabilities:** Any student in this course who has a disability that may prevent the full demonstration of his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

**Religious holidays:** It is the policy of the University to excuse absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

**Academic Integrity:** All work submitted for an individual grade, such as homework and projects should be the work of that single individual, not their friends or their tutor. Students who fail to do their own work not only violate the Code of Conduct for the University of Oklahoma, but also may fail to learn critical learning objectives for the class.

1. Do not show another student a copy of your homework or projects before the submission deadline.
2. Do not email your project to another student, even if they promise they will not copy it.
3. Make sure that your computer account is properly protected. Use a good password, and do not give your friends access to your account or your computer system.
4. Do not leave thumb drives around a laboratory where others might access them.
5. The penalties for knowingly permitting your work to be copied are the same as the penalties for copying someone else’s work.

Upon the first documented occurrence of breach of academic integrity, I will report the academic misconduct to the Campus Judicial Coordinator. The procedure to be followed is documented in the University of Oklahoma Academic Misconduct Code. In the unlikely event that I elect to admonish the student, the appeals process is described at http://integrity.ou.edu/students.html
Check out http://integrity.ou.edu/ for details about integrity at OU.

**Adjustments for Pregnancy/Childbirth Related Issues:** Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically
necessary and similar in scope to accommodations based on temporary disability. Please see www.ou.edu/content/eoo/pregnancyfaqs.html for commonly asked questions.

**Title IX Resources:** For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24.7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5) or the Sexual Assault Response Team 405-615-0013 (24.7) to learn more or to report an incident.

**Student ratings:** The College of Engineering utilizes student ratings as one of the bases for evaluating the teaching effectiveness of each of its faculty members. The results of these forms are important data used in the process of awarding tenure, making promotions, and giving salary increases. In addition, the faculty uses these forms to improve their own teaching effectiveness. The original request for the use of these forms came from students, and it is students who eventually benefit most from their use. Please take this task seriously and respond as honestly and precisely as possible, both to the machine-scored items and to the open-ended questions.