Course Description
Data abstraction and abstract data types. Topics include the design and implementation of
dictionary, priority queues, concatenated queues, disjoint set structures, graphs, and other
advanced data structures based on balanced and unbalanced tree structures. Special emphasis
will be placed on the implementations of these structures and their performance tradeoffs. Both
asymptotic complexity analysis and experimental profiling techniques will be introduced. Labs
will be used to provide students with hands-on experience in the implementations of various
abstract data types and to perform experimental performance analysis.

Lectures
MWF, 8am-8:50am, 2112 Learned Hall

Labs
M, 9-10:50am, 1005D Eaton Hall (Section 1), TA: Chiranjeevi Pippalla
W, 9-10:50am, 1005D Eaton Hall (Section 2), TA: Anubhav Ghosh
W, 12-1:50pm, 1005D Eaton Hall (Section 3), TA: Anubhav Ghosh
F, 12-1:50pm, 1005D Eaton Hall (Section 4), TA: Chiranjeevi Pippalla

Instructor
Dr. Suzanne Shontz
3016 Eaton Hall
Dept. of Electrical Engineering and Computer Science
Office Phone: (785) 864-8816
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Graduate Teaching Assistants
Anubhav Ghosh
3025 Eaton Hall
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Office Hours:
MWF 11am-12pm, or by appointment (Dr. Shontz)
T 9:30-10:30am and 1-2pm, W 4-5pm, or by appointment (Anubhav)
M 3-4pm, Th 9:30-10:30am, and F 2-3pm, or by appointment (Chiranjeevi)
Important Note: Dr. Shontz has a second office in 203 Nichols Hall. At times you will be asked to come to Nichols Hall to meet with me if you request to do so outside of office hours. Hence, it is recommended that you set-up meetings in advance via e-mail.

Text

Prerequisites
EECS 210 (Discrete Structures) and EECS 448 (Software Engineering I).

Course Requirements
Lecture attendance is required, although attendance will not be recorded. Laboratory attendance is required and will be recorded. Students must be present for the entire lab (unless they finish the lab early) in order to be counted as present. Three or more unexcused absences from lab will result in a failing grade for this course; proper documentation must be provided in order to be excused. Two late arrivals to lab will count the same as one unexcused absence. The course requirements for EECS 560 include class participation and approximately five homework assignments, eleven laboratories, two midterm exams, and a final exam. The homework assignments will require a combination of problem solving and mathematical analysis of data structures. The laboratories will require computer programming in C++. Prior knowledge of C++ is a prerequisite for the course.

Homework assignments will be due approximately 7-10 days after they are assigned. Due dates for homework assignments will be announced in class. Homework must be submitted in class in hard copy. If you are submitting homework at any other time (e.g., due to illness or a late submission), it must be submitted in hard copy via the EECS Department Office in 2001 Eaton Hall, and a timestamp must be placed on your submission.

Laboratories will be due approximately one week after they are assigned. Due dates for laboratories will be announced in lab. At times, a two-week lab will be assigned (so that more in-depth concepts can be explored). Laboratories must be submitted electronically to your GTA. The timestamp on your submission e-mail is the time that your submission is submitted.

There will be a penalty of 20% per day for homework or laboratories handed in up to 48 hours late. No homework assignments or laboratories will be accepted more than 48 hours late. No late homework assignment or laboratory will be accepted which is either (i) more than 48 hours late, or (ii) is not submitted by 11:59pm the day before Stop Day.

There will be two midterm exams and one final exam; the dates for the exams are given on the course calendar. Please reserve these dates on your calendar. The exams will be closed-book. A make-up midterm or final exam will be given to any student who is absent from an exam for a compelling reason and gets permission from the instructor.
The exams will cover topics drawn from the lectures, homework, and laboratories, and from the underlying data structures and their analyses. **The final exam will not be comprehensive.**

**Grading**
The homework assignments will count for 10% of the final grade. Laboratories will count for 20% of the final grade. Each midterm exam will count for 20%, and the final exam will count for 30% of the final grade, respectively.

**Important note:** You must earn at least a 50% average on each of the homework, laboratory, and exam portions of the course in order to receive a course grade of D or better. Failure to earn at least a 50% average on the homework, laboratory, or the exam component will result in a grade of F for the course.

Only after meeting the 50% minimum requirements for both the homework, lab, and exam portions of the course, your final grade in the class will then be computed by using the weighted average given above, the lab attendance policy above, and the following scale:

- A: [92%-100%]
- A-: [90%-92%)
- B+: [88%-90%)
- B: [82%-88%)
- B-: [80%-82%)
- C+: [78%-80%)
- C: [72%-78%)
- C-: [70%-72%)
- D+: [68%-70%)
- D: [60%-68%)
- F: [0%-60%).

This course will utilize +/- grading in Fall 2019 as indicated above.

Depending on overall student performance in the course, I reserve the right to lower (but not raise) the above grade cutoffs. However, this is not something you should count on.

**Class Schedule**
The course calendar shows a week-by-week syllabus. The dates and order of topics are subject to change by the instructor. Any significant changes will be announced in class.

**Course Website and E-mail**
There is a course website available at the following URL:
[http://people.eecs.ku.edu/~s906s230/eecs_560_fall_2019.html](http://people.eecs.ku.edu/~s906s230/eecs_560_fall_2019.html). E-mail will be used for announcements not given in class.
Computing Facilities
Students will have access to the linux machines in Eaton 1005D computer laboratory for running C++ codes. While you can edit and compile your code anywhere, your code must run on the linux machines (i.e, the EECS cycle servers) in this laboratory.

Additional Course Policies
1. You are responsible for all information we post on our class web site, including any possible changes to assignments after they are assigned.
2. Unless otherwise stated, all material from (a) lectures and laboratories, (b) homework assignments, (c) the underlying concepts, and (d) information posted on the class website are fair game for exams.
3. Except medical device(s) and laptop, no calculators, cell phones, or electronic devices will be allowed. No such devices should be out in the open. If you are using a laptop in class, it must be used solely for taking notes.
4. Occasionally you may not understand why points have been deducted from your homework assignment, laboratory, or exam. If so, you should come to see us. We will re-grade your whole homework assignment, laboratory, or exam, if, and only if, you contact us within one week after it has been returned in class. No homework assignment, laboratory, or exam, will be re-graded after it has been returned for more than one week, regardless of whether or not you were in class that day.
5. We are not responsible for any homework assignment, laboratory, or exam that you do not pick up after they have been returned in class. You will need to come to office hours to collect such work after it has been returned.
6. Keep all copies of your work. If you dispute any recorded score, you must bring in your original work for verification in order to have it changed.
7. If you have a mandated religious observance with conflicts with a scheduled midterm examination, please contact me privately at the beginning of the semester so that a make-up examination can be scheduled at a mutually acceptable time. (The university policy which applies to religious observances in conflict with examinations does not apply to the final examination since instructors do not schedule final exams.)

Academic Integrity Policy
Cheating in the course will not be tolerated. All submitted work must be strictly your own individual effort; there is no group homework assignment/laboratory/exam in this course. Discussing general strategies and formulating ideas with other students on the homework and labs is OK. However, more in-depth discussions are not OK. Sharing your work or copying is cheating, and submitting work that is not all yours, independent of your source, is also considered cheating. If you are having difficulty with a homework assignment or laboratory, please see the GTA or me. Anyone found cheating will receive a 0 on that work (homework assignment or laboratory) or an F in the class (midterm exam or final exam). A second incident will result in an F grade for the course. These penalties will be received by all parties involved, following a hearing with the instructor. In all cases, reports of academic misconduct will also be made to the Dean’s office where further disciplinary action may be taken in accordance with School of Engineering and University of Kansas guidelines. This may result in much more serious sanctions. It is your responsibility not to let anyone copy your homework assignment/laboratory/exam; otherwise, you may have to pay the price for others' misconduct.
Academic Achievement and Access
Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate the educational opportunity.

The Academic Achievement & Access Center (AAAC) coordinates accommodations and services for all KU students who are eligible. If you have a disability for which you wish to request accommodations and have not contacted the AAAC, please do so as soon as possible. Their office is located in 22 Strong Hall; their phone number is (785) 864-4064 (V/TTY). Information about their services can be found at http://www.achievement.ku.edu/. Please contact me privately in regard to your needs in this course.

Concealed Carry Policy
Individuals who choose to carry concealed handguns are solely responsible to do so in a safe and secure manner in strict conformity with state and federal laws (http://concealedcarry.ku.edu/information) and KU weapons policy (http://policy.ku.edu/university-kansas-policy-weapons-including-firearms-effective-july-1-2017).

Safety measures outlined in the KU weapons policy specify that a concealed handgun:
- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the carrier’s custody and control.
- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position.
- Must have the safety on, and have no round in the chamber.

Additional Lab Policies
1. The purpose of the laboratories is to give you an opportunity to implement various concepts developed in class, thereby learning them more deeply than is possible simply by reading the book and attending lectures.
2. Questions dealing with labs and laboratory assignments must be directed to the GTAs. If you still have difficulty after talking with the GTA, see the instructor for help.
3. All programs must be written in C++ and executable using our departmental linux systems. If you use another C++ development environment at home or elsewhere, it is your responsibility to make sure the code you submit compiles and runs correctly in the linux environment used in the lab. We will not debug your program for you. A program that will not compile on the machines in 1005D Eaton Hall will earn you at most 50% of the points.
4. Since you are learning to implement data structures, you may not use the STL library, and you may not use code that you find on the web or books other than your textbook.
5. Different lab assignments may have different scores as well as different due days.

Suzanne M. Shontz, Associate Professor, Department of Electrical Engineering and Computer Science, University of Kansas, shontz@ku.edu
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Aug. 26, 28, and 30:</strong> Introduction to Algorithmic Analysis</td>
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<tr>
<td>2</td>
<td><strong>Sept. 4 and 6:</strong> Dictionary and Hash Tables</td>
<td>No class on Sept. 2 (Labor Day). No lab this week. Homework #1 out on Sept. 6.</td>
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<td>3</td>
<td><strong>Sept. 9, 11, and 13:</strong> Dictionary and Hash Tables</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Sept. 16, 18, and 20:</strong> Trees and Their Implementations</td>
<td>Homework #1 due on Sept. 16. Homework #2 out on Sept. 16.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Sept. 23, 25, and 27:</strong> Trees and Their Implementations</td>
<td>Homework #2 due on Sept. 23.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Sept. 30, Oct. 2 and 4:</strong> Search Trees/Midterm Exam #1</td>
<td>Midterm Exam #1 on Oct. 2.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Oct. 7, 9, and 11:</strong> Priority Queues and Heaps</td>
<td>Homework #3 out on Oct. 7.</td>
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<tr>
<td>8</td>
<td><strong>Oct. 16 and 18:</strong> Priority Queues and Heaps</td>
<td>No class on Oct. 14 (Fall Break). No lab this week. Homework #3 due on Oct. 18.</td>
</tr>
<tr>
<td>9</td>
<td><strong>Oct. 21, 23, and 25:</strong> Concatenated Queues</td>
<td>Homework #4 out on Oct. 25.</td>
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<tr>
<td>10</td>
<td><strong>Oct. 28 and 30, Nov. 1:</strong> Concatenated Queues</td>
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<tr>
<td>11</td>
<td><strong>Nov. 4, 6, and 8:</strong> Disjoint Sets</td>
<td>Homework #4 due on Nov. 4.</td>
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<tr>
<td>12</td>
<td><strong>Nov. 11, 13, and 15:</strong> Disjoint Sets/Midterm Exam #2</td>
<td>Midterm Exam #2 on Nov. 13.</td>
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<tr>
<td>13</td>
<td><strong>Nov. 18, 20, and 22:</strong> Graph and Graph Algorithms</td>
<td>Homework #5 out on Nov. 22.</td>
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<tr>
<td>14</td>
<td><strong>Nov. 25:</strong> Graph and Graph Algorithms</td>
<td>No class on Nov. 27 and 29 (Thanksgiving Break). No lab this week.</td>
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<tr>
<td>15</td>
<td><strong>Dec. 2, 4, and 6:</strong> Advanced Data Structures</td>
<td>Homework #5 due on Dec. 6.</td>
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<tr>
<td>16</td>
<td><strong>Dec. 9 and 11:</strong> Advanced Data Structures</td>
<td>Dec. 13 is Stop Day. No lab this week.</td>
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<td>FINAL</td>
<td>Friday, Dec. 20 – 7:30-10:00am: Final Exam</td>
<td>Final Exam (non-comprehensive) on Dec. 20.</td>
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