CS 584/684 Algorithm Analysis and Design - Spring 2017 - Syllabus

Course web page: http://www.cs.pdx.edu/~apt/cs584

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Description

An advanced in-depth study of the design and analysis of algorithms.

Topics (tentative)

Divide-and-conquer; Computational geometry; Parallel algorithms; Probabilistic algorithms and analysis; Dynamic programming; Greedy algorithms; Amortized analysis; Disjoint set algorithms; Graph algorithms; NP-completeness and approximation.

Texts

Additional readings available from the web may be required from time to time.
Lectures notes will be made available on the course web page after the relevant lecture(s), on a roughly weekly basis.

Prerequisites

CS350 or equivalent, e.g. CLRS Chapters 1-4, 6-13, 22 (excluding starred sections). Students should have basic familiarity with asymptotic notation and mathematical techniques for computing asymptotic algorithm complexity, and with standard algorithms and data structures for sorting and searching. Also, students should be able to program fluently in at least one high-level language such as Python, Java, C, or Haskell.

Grading

Grading will be as follows:
5% on weekly quizzes;
40% on weekly homeworks;
25% on in-class midterm;
30% on final exam.

Homework

There will be weekly homework assignments, which will include exercises in algorithm design and analysis, and (often) at least one problem requiring programming. Programs can be written in the language of your choice (within reason; consult with the instructor and TA if in doubt). With the exception of the programs, all assignment submissions must be type-set using \LaTeX and submitted (by email) in .tex and .pdf formats.
Schedule

The class meets each Monday and Wednesday from 2:00-3:40pm. Reading specified for each week should be done before the Monday meeting. There will be a quiz on the reading on most Mondays.

A typical reading assignment will be one or two chapters from CLRS. There will be a few additional assigned readings made available on the web.

Homework assignments will be issued on Wednesdays and due (by email) the following Wednesday at noon.

All dates, including assignment deadlines, are highly subject to change (especially the topics).

<table>
<thead>
<tr>
<th>Date</th>
<th>Reading</th>
<th>Topics</th>
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</thead>
<tbody>
<tr>
<td>Apr</td>
<td>CLRS 9</td>
<td>introduction; divide-and-conquer; selection</td>
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<tr>
<td>10 &amp; 12</td>
<td>CLRS 33</td>
<td>computational geometry</td>
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<tr>
<td>17 &amp; 19</td>
<td>CLRS 27</td>
<td>multi-threaded algorithms</td>
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<tr>
<td>24 &amp; 26</td>
<td>CLRS 5, Skip Lists</td>
<td>probabilistic algorithms</td>
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<tr>
<td>May</td>
<td>CLRS 15</td>
<td>dynamic programming</td>
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<tr>
<td>8</td>
<td></td>
<td>Midterm Exam (in class)</td>
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<tr>
<td>10</td>
<td>CLRS 16,23</td>
<td>greedy algorithms; minimum spanning trees</td>
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<tr>
<td>15 &amp; 17</td>
<td>CLRS 17,21</td>
<td>amortized analysis; disjoint sets</td>
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<tr>
<td>22 &amp; 24</td>
<td>CLRS 25,26</td>
<td>shortest paths; max flow and min cut</td>
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<td>29</td>
<td></td>
<td>Memorial Day – No Class</td>
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<tr>
<td>31</td>
<td>CLRS 34</td>
<td>NP-completeness</td>
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<tr>
<td>Jun</td>
<td>CLRS 35</td>
<td>approximation; review</td>
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<tr>
<td>5 &amp; 7</td>
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<tr>
<td>14</td>
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<td>Final Exam (Wednesday starting at 12:30 pm)</td>
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Computing Facilities

Some of the homework problems will require writing and testing code in any of a variety of languages. Students who lack their own facilities for doing this may use the CS department’s linuxlab machines. You should already have accounts on these machines; your account can be activated by taking your PSU id to FAB 82-01.

Staying In Touch

All students should subscribe to the course’s mailing list cs584list@cs.pdx.edu; the subscription page for this list is accessible from the course web page. The instructor will use this list to communicate important announcements, homework hints, etc. Students may also use this list to alert the class to information of general interest (but see the next section).

Individual Work

All homework assignments, exams, and quizzes must represent your own, individual work. It is permissible to discuss assignments with other students, but the solutions must be recognizably your own. Do not, under any circumstances, copy another person’s work and submit it as your own. Writing code for use by another or using another’s code or solutions in any form (even with their permission) will be considered cheating. Also, please do not make your solutions publicly available (e.g. on a mailing list, on GitHub, etc.). Cheating on an assignment, exam, or quiz will result in an automatic zero grade for that piece of work, and the initiation of disciplinary action at the University level.

Disabilities

If you are a student with a disability in need of academic accommodations, you should register with Disability Services for Students and notify the instructor immediately to arrange for support services.