

## CSCI 1570: Design and Analysis of Algorithms

### Course Information and Syllabus Semester I, 2020-2021

Instructors	Lorenzo De Stefani ( <a href="mailto:lorenzo_destefani@brown.edu">lorenzo_destefani@brown.edu</a> ) Roberto Tamassia ( <a href="mailto:roberto_tamassia@brown.edu">roberto_tamassia@brown.edu</a> )
Course description	<p>This is a core undergraduate Computer Science course on foundations of algorithmic theory and applications.</p> <p>The questions it aims to answer are:</p> <ol style="list-style-type: none"><li>(1) What are the different algorithmic archetypes?</li><li>(2) How can we analyze the performance of algorithms?</li><li>(3) Which design guidelines should be followed towards achieving efficient algorithms?</li><li>(4) What data structures can be used for specific algorithmic tasks?</li></ol> <p>We will cover these questions and, in the process, explore the use of algorithms in important applications such as artificial intelligence, data management, network analysis, and geographic information systems.</p> <p>The course has lectures, written homework assignments, and exams.</p>
Topics	<ul style="list-style-type: none"><li>• Methodologies for algorithms analysis</li><li>• Data structures</li><li>• Sorting and searching</li><li>• Greedy algorithms</li><li>• Dynamic programming</li><li>• Divide &amp; conquer</li><li>• Graph algorithms</li><li>• Text analysis and pattern matching</li><li>• Geometric algorithms</li><li>• Algorithms for external memory</li><li>• Online algorithms</li></ul>
Prerequisites	CSCI 0160, CSCI 0180, or CSCI 0190, and one of CSCI 0220, CSCI 1010, CSCI 1450, MATH 0750, MATH 1010, MATH 1530.
Lectures	<p>Tuesdays and Thursdays. Time: 14:30-15:50.</p> <p>During Fall 2020, the class will be offered fully online in synchronous mode. Students are strongly encouraged to attend live classes. Recordings of the classes will be available for students who cannot attend live classes.</p>
Course Website	<a href="http://cs.brown.edu/courses/csci1570/">http://cs.brown.edu/courses/csci1570/</a>
Text	<p>M. T. Goodrich, R. Tamassia - Algorithms Design and Applications, Wiley, 2014, ISBN: 978-1-118-33591-8</p> <p><a href="https://www.wiley.com/en-us/Algorithm+Design+and+Applications-p-9781118335918">https://www.wiley.com/en-us/Algorithm+Design+and+Applications-p-9781118335918</a> <a href="https://www.amazon.com/Algorithm-Design-Applications-Michael-Goodrich/dp/1118335910">https://www.amazon.com/Algorithm-Design-Applications-Michael-Goodrich/dp/1118335910</a></p>

Professor's Office Hours	Lorenzo De Stefani - <a href="https://ldscs1570ohf20.youcanbook.me">https://ldscs1570ohf20.youcanbook.me</a> Roberto Tamassia - by appointment (contact Dawn Reed, dawn_reed@brown.edu)
Graduate TA	Archer Wheeler (archer_wheeler@brown.edu)
Head TA	Evan Velasquez (evan_velasquez@brown.edu)
UTAs	Beenish Valliani, Cori Williams, Huy Pham, Joseph Hlavinka, Nam Do, Nickolas Eisele, Omer Dai, Prithu Dasgupta, Qiaonan Huang, Rajyashri Battula, Ross Briden, Sebastien Lamy
TA Office Hours	<a href="http://cs.brown.edu/courses/csci1570/hours.html">http://cs.brown.edu/courses/csci1570/hours.html</a>
Coursework and Workload	The coursework consists of four homeworks and two take-home midterms. During the semester, students will spend about 3 hours per week attending lectures (33 hours total) and 24 hours per homework (96 hours total). Additionally, each of the two midterm exams is expected to take 20 hours of preparation and 10 hours to complete (60 hours total). Thus, the overall expected course workload is 189 hours.
Grading	Final numerical grades are determined using the weights below: <ul style="list-style-type: none"> <li>• Homeworks 60%</li> <li>• Midterm I 20%</li> <li>• Midterm II 20%</li> </ul>
Submission and Late policy	Homeworks and exams must be typeset (LaTeX is strongly preferred as it facilitates the formatting of math formulas and pseudocode) and submitted as PDF documents using GradeScope. Help with LaTeX and GradeScope will be provided.  Each student is given 4 late day passes to extend the submission deadlines of homeworks and midterms. However, no more than 2 passes may be applied to a given deadline.  Additional late day passes may be granted by the instructors in consideration of extenuating circumstances (e.g., illness). Requests should be submitted to the instructors at least 24 before a deadline via a Google form that will be linked from the course website.
Collaboration Policy	<b>Homeworks:</b> We allow (and encourage!) discussion of material presented in lectures, help sessions, and the textbook, as well as discussion of concepts involved in homework assignments. Written work is another matter. <b>You must write up your homework solutions by yourself.</b> This ensures that you understand the material even if you collaborated on the problem. <b>You should not take notes away from collaboration sessions</b> , and should be by yourself when writing the solution. <b>Please list any homework collaborators on your submission.</b> Rule of thumb: If you cannot independently reproduce what you hand in, don't hand it in. We reserve the right to request that you explain your solution to a problem, so we can ensure that the solution was your own handiwork.  <b>Midterms:</b> No collaboration is allowed for Midterm I and Midterm II. You should not discuss the midterm problems or their solutions with anyone, nor post public questions about them on Piazza. Clarifications on the midterm problems may be requested by sending a private question to the TA staff on Piazza.

	<p>For more details, see the Collaboration Policy document that will be posted on the course website. At the beginning of the course, all students are required to formally indicate to understand and agree to abide by the course collaboration policy.</p>
<p>Diversity: All are Welcome</p>	<p>The course intends to provide a welcoming environment for all students. We especially welcome diverse ideas and perspectives during class discussions.</p> <p>All members of the CS community, including faculty and staff, are expected to treat one another in a professional manner. Toward this goal, TAs have undergone training in diversity and inclusion. However, despite our best efforts, we may accidentally slip up, so please feel free to speak to any member of the course staff with any concerns you have during the semester and do not hesitate to contact Lorenzo and Roberto directly. We will take your concerns very seriously. And in case you believe you need to escalate your concerns further, you can reach out to Professor Tom Doeppner (Vice Chair and Director of Undergraduate Studies).</p>
<p>More Information</p>	<p>For more in-depth information about the course, refer to the course website <a href="http://cs.brown.edu/courses/csci1570">http://cs.brown.edu/courses/csci1570</a></p>
<p>Accommodations</p>	<p>If you feel you have physical, psychological, or learning disabilities that could affect your performance in the course, we urge you to contact SEAS, <a href="https://www.brown.edu/campus-life/support/accessibility-services/">https://www.brown.edu/campus-life/support/accessibility-services/</a>. We will do whatever we can to support accommodations recommended by SEAS.</p>
<p>Mental Health</p>	<p>Being a student can be very stressful. If you feel you are under too much pressure or there are psychological issues that are keeping you from performing well at Brown, we encourage you to contact Brown's Counseling and Psychological Services, <a href="https://www.brown.edu/campus-life/support/counseling-and-psychological-services">https://www.brown.edu/campus-life/support/counseling-and-psychological-services</a>. They provide confidential counseling.</p>
<p>Coping with Unforeseen Events</p>	<p>If there are events that are upsetting to you, whether political, family-related, weather-related, etc., that affect your ability to do well in class, we are happy to take them into account with respect to our late and incomplete policies. Please feel free to talk to Lorenzo De Stefani about this.</p>