Course Missive
Fall 2015

Time and Location: MWF 1:00 – 1:50 PM in Metcalf Auditorium

Textbooks: The first textbook is a convenient and inexpensive paperback, which concisely introduces many of the topics we cover; we recommend buying it or obtaining a digital copy. The second (optional) textbook is encyclopedic, and a useful reference for more topics; it is available online for free through the Brown libraries, with a Brown login.


Course Staff

<table>
<thead>
<tr>
<th>Professor</th>
<th>Office</th>
<th>Email (@cs.brown.edu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Paul Valiant</td>
<td>CIT 379</td>
<td>pvaliant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Head Teaching Assistants</th>
<th>@cs.brown.edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eli Rosenthal</td>
<td>ezr</td>
</tr>
<tr>
<td>Libby Zorn</td>
<td>ezorn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graduate Teaching Assistants</th>
<th>@cs.brown.edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas Dickerson</td>
<td>tdickerson</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Undergraduate Teaching Assistants</th>
<th>@cs.brown.edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankit Shah</td>
<td>avshah</td>
</tr>
<tr>
<td>Emily Wu</td>
<td>eswu</td>
</tr>
<tr>
<td>Eric Xiao</td>
<td>ex1</td>
</tr>
<tr>
<td>Graham Carling</td>
<td>gcarling</td>
</tr>
<tr>
<td>Gabe Lyons</td>
<td>glyons</td>
</tr>
<tr>
<td>Jessica Liang</td>
<td>js115</td>
</tr>
<tr>
<td>Kenneth Lin</td>
<td>kl47</td>
</tr>
<tr>
<td>Max Fuller</td>
<td>mjfuller</td>
</tr>
<tr>
<td>Rahul Kuchibhatla</td>
<td>rkuchibh</td>
</tr>
<tr>
<td>Sam Dooman</td>
<td>sdooman</td>
</tr>
<tr>
<td>Uthsav Chitra</td>
<td>uchittra</td>
</tr>
</tbody>
</table>

Introduction

Welcome to CS157, Design and Analysis of Algorithms.

The course satisfies the theory requirement for the Sc.B. track in Computer Science.
Prerequisites

In order to take CS157, you should have taken (CS16 or CS18 or CS19) and (CS22 or CS145) or their equivalents. If you are a graduate student or a non-CS concentrator, these prerequisites are intended to cover three things: a semester of programming (in any language); a semester of very basic exposure to algorithmic concepts (for example, Dijkstra’s algorithm, sorting algorithms, and big-O notation); and a semester that introduces proofs in a computer science or discrete math context.

This course will emphasize both theoretical and practical aspects of algorithms. For the theoretical side, we require “mathematical maturity,” which means either previous exposure to fundamentals like matrices and complex numbers, or a willingness to get caught up quickly. In addition, we will enforce a rigorous and formal proof style throughout the course to help us gain deeper insight into algorithms. For the practical side, demos and examples will usually be done with Matlab, as will some homework assignments. Matlab is easy to learn if you have a programming background.

Grading

The overall course grade is made up of the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework (∼ 10 assignments)</td>
<td>45%</td>
</tr>
<tr>
<td>Oral Exam and “Team Contest”</td>
<td>5% each</td>
</tr>
<tr>
<td>Midterm</td>
<td>15%</td>
</tr>
<tr>
<td>Final</td>
<td>30%</td>
</tr>
</tbody>
</table>

Exams will be curved before contributions to final grades are calculated.

Assignments

There will be roughly one assignment due each week in this class. All assignments (unless otherwise stated) will be done in pairs. For homeworks 1 through 5 you must use a different partner each time. For the remaining homeworks you may use partners you have used before. Each pair will turn in a single handin.

Working in pairs will give you an opportunity to improve your thinking, communication, and writing skills. If something you write requires a verbal explanation for your partner to understand it, consider this a valuable sign that this explanation should be included in your writeup. In particular, you are responsible for everything you and your partner submit. It is an academic code violation to sign your name to something that is not yours. Further, however, the material covered on the homework will help prepare you for the exam, so aim for mastery of all of it.

All written assignments must be legible (we prefer they be typed with \LaTeX, although we will not penalize hand-written work if it is neat; whether or not you use \LaTeX, consider drawing diagrams by hand). Assignments must be handed in to the CS157 handin bin located on the second floor between the fishbowl and the lockers. Each problem should be handed in separately, with your names at the top. Any programs we ask you to write will be handed in electronically using the CS157 handin script, cs157_handin.

All homeworks will go out on Friday after class. Most assignments (except homework 0) will have
three different due dates: early, on-time, and late. The early deadline will fall on Tuesdays at 6:00
PM. If you turn it in before the early deadline, you will get 5% extra credit. The second deadline is
on-time, and it will fall on Fridays at 6:00 PM. The third deadline is late, and it will fall on Sundays
at 6:00 PM. A late assignment will result in a 20% deduction. Feel free to turn in different problems
at different deadlines, but you must turn in every part of a problem at the same deadline. This
holds true even for problems with multiple parts. Sometimes we will ask you to write a program
and then, in words, answer some questions about that program. This should be handed in by the
same deadline, even though one part is an electronic handin and the other is a paper handin. If
you turn in two parts of the same problem at different deadlines, we will grade both parts on the
later of the two deadlines.

Because of the fast pace of the class, exceptions/extensions will be granted only in exceptional/exten-
sional circumstances by the professor, and must be requested at least 24 hours in advance.

Corrections to the inevitable errors in problem sets will be emailed to the listserv cs157.2015-16.f
@lists.cs.brown.edu. You are responsible for all information sent to the listserv. If you are
registered for the course, you will be added to the listserv at the beginning of the semester. If you
are not on the listserv, please email cs157headtas@cs.brown.edu and we will add you.

Solutions for homeworks and problem sets will be posted on the course web page, possibly password
protected (we will tell you the passwords!).

The midterm will be on Thursday, October 15 at 7 – 9 PM, in MacMillan 117.

The final (as listed on Banner) will be on Wednesday, December 16, 2015 at 9AM – 12PM.

Standards for Written Work

One of the goals of this course, and indeed a computer science education in general, is to train
you to write to a professional standard. This means that, unless we explicitly say otherwise, you
should justify every answer you turn in, via a proof—of runtime, or correctness, depending on
the problem. More generally, you should aim to produce written work which would you could
imagine fitting in a computer science journal. Specifically, what you hand in should have a clear
order of presentation, with each sentence/algorithm/equation/diagram clearly fitting into a logical
whole. Try reading your homework aloud to yourself before you turn it in: if this is impossible, or
awkward, then you probably need to organize it differently. As you get better at this, your writeups
will become shorter and clearer.

Grading is done by course staff (including undergraduate TAs) under supervision of the professor.
We encourage you to discuss homework writeups (past and future) with course staff; bring past
homeworks to the TA who graded it, or to more senior course staff—the head TAs and professor.

Oral Exams and “Team Contest”

Instead of homeworks on two weeks we will have interactive events. Late in the course (the week of
November 11), will be an oral exam, where instead of turning in a written homework, you will solve
the problems (individually or in a group) and then you, individually, will sign up for a 10 minute
time where the course staff will ask you to explain one or more of your solutions. As a warm up for
this, early in the course (week of September 30) we will have a “team contest,” a fun event where
you will compete on teams to present solutions to a variety of problems under a time limit. These activities are designed to help you build confidence in your ability to clearly present algorithmic concepts, and will complement the written homeworks. The TAs would love to help you improve your presentation skills (written and oral). Come to office hours.

**Contacting the Course Staff**

When e-mailing the course staff, please follow these guidelines.

- Do not e-mail individual TAs unless you have a question specific to their grading.

- If you have a quick clarification question or you find that the handin scripts are not working, please e-mail cs157tas@cs.brown.edu. To aid us in responding to you quickly,
  - Make sure your subject is a clear, accurate description of the content of your e-mail.
  - Keep your e-mails short. If your e-mail is long (say, more than one screen long), your question is better suited for TA Hours; you should ask your question there.

- Questions or comments about course policies, or more confidential questions should be sent to cs157headtas@cs.brown.edu.

- Requests for an extension or questions about final grades should be sent to the professor pvaliant@cs.brown.edu.

Your peers or office hours are usually the best way to get an answer to your question.