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1 Introduction

Welcome to CS15, Introduction to Object-Oriented Programming and Computer Science!

CS15 is a course that focuses on introducing students to computer science through object-oriented design and programming using the programming language Java. The course covers methods and parameters before moving on to objects and classes, and the power of inheritance, interfaces and polymorphism. Object-oriented programming is then used to teach simple 2D graphics and graphical user interfaces, and the course finishes up with an overview of basic data structures, exceptions and file input/output.

CS15 meets Fall semester on Tuesdays and Thursdays from 2:30 to 3:50 pm in DeCiccio Family Auditorium (Salomon 101). It is taught by Professor Andy van Dam with the assistance of Undergraduate Teaching Assistants (UTAs).

There are no prerequisites for CS15 and the course expects no prior programming experience, which is indeed the case for most students taking it.

1.1 Initial Mechanics

For CS15 internal registration, if you are even considering taking the course, we need you to register on banner before the first lab section. If you are a RISD student interested in taking the course, you must email the Head TAs at cs015headtas@cs.brown.edu in order to complete this process (preferably before the first day of class).

You will need to complete the Collaboration Contract at the first lab. If you have concerns about registration or if you miss the introductory lab, please see a Head TA as soon as possible to insure you obtain a department account.

1.2 CS15: Yesterday and Today

The course regularly undergoes a major paradigm shift to anticipate developments in the rapidly changing field of computer science. Over a decade ago, we taught object-oriented design and programming for the first time. Object-oriented programming focuses on code reuse: it allows programmers to have access to existing libraries of tested objects that provide a broad range of functionality. It is one of the most exciting and important concepts in computer science today and has become standard practice in industry.

This year, we’ve made several significant changes to the course, including updating the graphics library that we teach. Prior to this year, our projects used Swing, which came out in 1996. Over the summer, a group of hard-working UTAs updated the course to use JavaFX, Java’s new library that provides more modern graphics. In addition to this major change, we are introducing Piazza, an online Q & A forum, as well as adding a “No Code” line to some TA Hours for students who wish to discuss concepts and/or design.
2 The Course

Traditionally, CS15 has been both a lot of work and a lot of fun. We hope that, in “learning by doing,” everyone will come to appreciate computers, what they can do, and what they can’t do.

CS15 is a standalone course which introduces computers, systematic analysis of problems, and object-oriented design and programming techniques. The course may be taken by anyone, with or without previous computing experience. No math background beyond basic algebra is required. Anyone considering a concentration in Computer Science or contemplating taking other courses in the CS department should consider taking either CS15, CS17, or CS19 as a gateway course. If you decide to concentrate in Computer Science after taking CS15, you will continue with CS16 in the spring.

Click here to see a comparison of the various introductory Computer Science classes offered at Brown for both concentrators and non-concentrators.

2.1 The Professor

Professor Andries van Dam, known to all as Andy, has been at Brown since 1965. He helped start Computer Science at Brown and was the department’s first chairperson. Andy is very informal and encourages, indeed demands, student feedback and class participation. His office is Room 465 of the CIT. Andy’s office hours are by appointment. His administrative assistant, Lisa Manekofsky (ljm@cs.brown.edu), books his appointments and can be reached at x3-7653.

2.2 The TAs

Visit the TA roster to see this year’s top-notch staff. The TAs - all of whom are undergraduates at Brown who did well in CS15 and know the material inside out - have three main functions:

- They evaluate and give critical feedback on your assignments.
- They are the people to whom you go with any questions you might have. They’re not there only to help people who are having trouble with a concept or assignment, but also for clarification of points brought up in class and general questions about Java, the assignments, object-oriented programming, how the class is run, and computer science as a whole. Please don’t hesitate to seek help and advice from them; that’s what they’re there for.
- They lead weekly 90-minute labs. Labs are designed to provide a more personal interaction between students and TAs than is possible in the large lecture format, as well as to reinforce concepts and syntax learned in class.
All regular TAs grade programs, hold TA hours, and have other assorted duties. The Head TAs (who were TAs in previous years) are responsible for the organization and administration of the course. They also supervise the regular TAs in grading programming assignments to ensure consistent grading.

3 Course Material

All course materials can be found on the course website. Slides for the lectures are released the day before, and audio recordings of the lectures are posted following class. Assignments and labs are also posted on the site when they are released. Please check the site often - we recommend you check the website every day since it is frequently updated with notices and announcements.

3.1 Lectures

CS15 lectures are Tuesday and Thursday, 2:30pm - 3:50pm. Expect to stay for the full lecture each class day as Andy will always attempt to give you your money’s worth. You are expected to attend all class hours. A copy of the lecture slides will also be accessible online, from the CS15 homepage. You are responsible for everything said in class.

In case you do need to miss lecture, there are ways of catching up. In particular, you can use the CS15 website to download Andy’s notes and listen to audio (recording synced to the corresponding Powerpoint slides) for every lecture.

3.2 Labs

As CS15 students, you will be using the Sunlab (CIT 143) to work on your assignments. Part of your experience in CS15 will be getting used to working on the Linux operating system. The first few labs are designed to ease you into these wonderful worlds of Java and Linux.

There will be weekly 90-minute labs, attendance of which is mandatory. Labs are designed to provide an environment where students can practice coding in Java with the supervision of 3-4 TAs. These labs are designed to allow students to write small programming assignments with the support of their TAs without the pressure of being graded (though you will be given credit for completing the lab, which will be factored into your final grade). Labs will also review concepts covered in class that you may have problems understanding and give you extra practice applying the concept. In addition to programming and discussing Java syntax issues, labs will include topics such as good program design, different design ideas and tradeoffs for your assignments, and final project options.

While labs do not need to be completed right away, we require that labs be turned in before the end of the next Lab period (the Thursday of the next week by 11:59PM) by
visiting TA hours. You will be given full credit (100%) for completing the labs and no credit (0%) for labs you do not complete within the accepted time frame. All labs will meet in the Sunlab (CIT 143), located on the first floor of the CIT.

3.3 Handouts & Emails
We have spent a lot of time putting all course materials and handouts together to help you, so please read them carefully and thoroughly. **You are responsible for the contents of each and every handout.** We cannot stress enough how important it is for you to be familiar with everything we give you.

The TAs will also send out emails containing useful administrative information and assignment clarifications to the class email list. Be sure to check your email at least daily to stay updated. **You are responsible for information contained in class-wide emails.**

It is up to you to ask the TAs questions when you don’t understand the material. If you don’t understand what was covered in lecture, see a TA before you try to write the program. Claiming that you don’t know something for which you are responsible is not a valid excuse.

3.4 Projects
CS15 has 7 programming assignments throughout the semester, culminating in a final project. The last 5 projects consist of a written design questions in addition to the programming component.

3.5 Design Questions
With each assignment handout, starting with TASafeHouse, we will attach a list of questions that are meant to get you thinking about the “right” way to design the program. For each assignment, you will need to type out your answers, convert them to a PDF, and use the appropriate handin script to submit it by the date and time specified on the assignment handout. Thinking about design before starting to code will greatly reduce the time spent programming (and especially debugging).

3.6 Interactive Design Checks
For DoodleJump, Tetris, and the Final Projects, you will be doing interactive design checks with the TAs instead of written design questions. You will sign up for a time during a 3 to 4 day period to meet one-on-one with a TA and verbally present answers to design questions posted on the website. Each check will last 15 minutes. You must be able to justify any design decisions you make to the TA. Scores for your design check will be emailed after the one-on-one interaction.
3.7 Homeworks

CS15 also has a handful of written homeworks to help solidify lecture topics. Like design questions, these must be typed and handed in as a PDF.

4 How to be Successful in CS15

While CS15 is challenging, there are many things you can do to stay on top of the work for the course.

4.1 Using TA Hours

CS15 is unusual both in the amount of day-to-day work involved and in the amount of personalized help available. With one TA for approximately 8 students, this course offers a great deal of help to those who use the TA system wisely. In particular, we offer over 150 TA hours per week where you can get one-on-one help.

TA office hours will be held in the TA room (CIT 271), also known as the Fishbowl, every day of the week! A listing of TA hours will be available online. CS15 uses a wait line program called SignMeUp (signmeup.cs.brown.edu). Students can sign up for hours by visiting the Fishbowl and using the designated SignMeUp computer to add their names to the queue, and will be notified when it is their turn.

Although your TAs are here to help you in any (course-related) way they can, please keep in mind that they are undergraduate students as well. They all have classes and lives. We ask that you obey the following (common-sense) rules:

- Do not take undue advantage of the TA system. This means that you should not go to hours and expect a TA to look up material printed plainly in the lecture slides or to write a program for you. (Of course, if you have read through and thought about the slides or assignments and still do not understand something, then go to a TA as soon as you can.) To save both the TA’s time and yours, think out your problems before going to see a TA. If you have a question about the course or its contents, check to see if it has been answered in any of the handouts or if a clarification email was sent.

- If there is an error in one of your programs, you must first try to find it and fix it yourself. Be sure to utilize the resources available through the CS15 website, such as Piazza and the JavaFX Guide. If, despite your dedicated efforts, the program still doesn’t work, head to TA hours along with relevant documentation, pseudocode, design and object breakdown, and evidence of your debugging efforts (this would include your analysis of the problem and any ideas for possible explanations). TAs have been instructed to turn away students who can not provide evidence of attempting to solve their problem on their own.
• In order to ensure that you have put ample time trying to fix your problem on your own, you will only be allowed to sign up for TA help once an hour. The SignMeUp system will enforce this rule.

• Waiting until the last few days before an assignment is due is a very bad idea. Wait times grow and you will wait disproportionately longer; in fact, you may not get your question answered at all. The TAs reserve the right to end TA hours promptly at the time posted. Thus, if TA hours are scheduled from 7:00pm to 11:00pm, and there are already 10 students on line by 10:30pm, the TAs may ask students arriving after 10:30pm to come back the next day. So, if a due date is near, do not depend on asking a question in the last 10 minutes of that night’s TA hours. To help you take advantage of less busy times, we have added some morning hours.

• Although the TAs are fellow undergraduates, please remember that this does not make them fair game for help outside of TA hours. It is very tempting to ask a TA a “quick question” when you see one of them in the lab or elsewhere. We therefore insist that you do not ask TAs course-related questions outside of class, TA hours, or lab. In order to ensure that this does not happen, the entire TA staff has been instructed not to answer questions outside of hours. Please respect your TAs’ rights to have their own private lives.

If you have concerns about the class, or are thinking about dropping it, you should talk to a Head TA first. Learning to program can be overwhelming at first, so sometimes that little extra help can make it all click. If you cannot make one of their TA hours, feel free to set up an appointment by emailing the HTAs.

4.2 Piazza

This year, CS15 is introducing Piazza, an online Question & Answer academic forum. We encourage you to use Piazza in a similar manner as TA hours—to ask general concept-oriented questions as well as clarifying questions for assignment specifications. Piazza will function as a place to crowd-source common questions for the benefit of the entire class. Refer to the Collaboration Policy for guidelines on using Piazza.

4.3 Help Sessions

Help Sessions will be offered for many projects. After the design questions have been turned in, the TAs will look through them looking for problematic areas. A help session will then be held to address these issues as well as any other areas we feel you may need some extra help on. If you cannot make it to the help session, it will be available in recorded form off of the website.

TAs will also offer Help Sessions for miscellaneous computer science topics, for example, how to work locally from your laptop or how to prepare for software engineering interviews.
4.4 The Pace: Keeping Up

In general, CS15 and other programming courses require that you start working consistently from the time an assignment is handed out. This will prevent you from getting blown away by unexpected bugs, hardware or software problems, a crowded lab, or long lines at TA hours. Procrastination followed by cramming will result in great pain and anguish, while working consistently prevents CS15 from becoming a killer course. This is not a threat but a survival tip.

**STARTING EARLY IS THE KEY TO SUCCESSFUL PROGRAMMING.**

Keep in mind that assignments are closely spaced and that each assignment uses concepts from previous work. This makes it very difficult to fall behind on one assignment and still complete the next one. We will rarely give extensions, and only for truly extenuating circumstances (the pressure of other courses not being one), and will grant incompletes in the course only if formally approved by a dean.

As a rule, we won’t grant exemptions for religious holidays. We will do our very best to get assignments released sufficiently early so that those of you who will be away can get started early enough to meet the deadline.

5 Grading

There will be no tests, quizzes, papers, or final examinations in CS15! Your grade in this course will be based solely on your performance on the assignments. Assignments are weighted, with the more difficult and important assignments due later in the semester. After assignments are handed in, they are distributed amongst the TAs for grading. After the TAs grade and comment on the work and their grades are re-checked by the HTAs, they will send the students their graded homework. All graded assignments will be handed back via email.

5.1 How We Grade

The UTAs will review and grade all of your assignments. After an assignment has been graded, the TAs will email you with your grade report. Be sure to re-read what you’ve done and pay attention to the TA’s comments.

Any questions regarding grading must be addressed to the TA who graded your particular assignment. No other TA can answer questions pertaining to your specific grade. If you are unable to resolve an issue with a TA, you may take your concerns to the HTAs.

**Written assignments that are handed in after the due date listed in the calendar will not be accepted and will receive a “No Credit.”** Programming assignments that are handed in after the due date listed in the calendar will be assigned penalties. All programs must be handed in by their late dates in order to avoid receiving an NC on the assignment. Any programs handed in late will not have any extra credit assessed.
We consider grades a necessary evil and would like to view them primarily as a standardized means for giving you feedback on how well you are doing. You should not be overly concerned with initial grades, but continued low marks indicate a problem in understanding the material and should be reason enough to see a TA for help.

5.2 Minimum Functionality Requirement

In order to pass CS15, we require that you complete all projects with at least “minimum functionality.” That is, an acceptable version (i.e., worthy of a grade higher than NC) of all projects must be submitted by the end of the semester in order to pass the course. **Thus, you must redo an assignment even if you will not receive a grade higher than an NC for it, and it’s possible to not pass CS15 even with a passing absolute grade in the class.**

5.3 Grading Standards

As we stated before, your final grade will be based upon individual assignment grades, your final project grade, and lab participation. Cutoffs will not be determined until the end of the semester. If you are on the borderline between letter grades, whether you have consistently handed in assignments, a general upward trend throughout the semester, and a strong finish will be taken into account. **To reiterate: in addition to these grades, students will receive course credit only if they submit minimally functional versions of all assigned projects.**

Your grade for a particular assignment is determined by how well it meets the standards set in the course and the assignment specifications, not simply by whether or not it works. Part of the art of programming involves a structured, disciplined approach to solving problems. Conventions for programming are stated explicitly in the CS15 Style Guide and in lecture slides through examples. For each project, 40% of the grade will be based on design and style.

The table below shows the relative weight of each assignment used in calculating the final grade. The weights may change slightly over the semester.
Note that the last 5 programming assignments, a portion of the grade (specified on the assignment handout) will be given for design questions or a design check.

5.4 Early Handin Incentive

In past years, despite repeated warnings to students to start early and finish early, there have been 3-4 hour long bottlenecks during TA hours in the few days before a program is due. Students also did not seem to learn from the experiences of the first few programs; indeed, the waitlists and bottlenecks got worse as the semester went on.

Thus, in order to motivate you to start early and finish early, and thereby help alleviate these stresses, we developed an early handin incentive. Any students who hand in their programs two or more days before the on time due date will receive extra credit of 4% of the total value of that program (e.g., a score of 80 on a program worth 100 points would become an 84).

We will only count the last handin that you submit. If you handin early and then revise your program and handin on time or late, your early handin will be ignored.
Note: written homeworks do not have early dates.

5.5 Late Policy

The late policy for written assignments is very simple: no handins will be accepted after the due date printed on the assignment. There are no “late days” for these assignments.

Our late policy for programming assignments is based on piles of feedback from past CS15 students:

- Programs handed in online after the due date and time are considered late. Programs are typically given a late due date and time specified in the handout two days after the assignment’s due date. This information is available on the assignments page of the course website. Programs handed in after the due date but before the late date will be penalized 8% of the possible points for that assignment. (A late submission of a program that would have received 47 out of 50 points would instead receive 43 points.

- You are entitled to one “free” late pass during the semester. The late pass allows you to turn in one program by the late date without penalty. Note that you CANNOT use your late pass on the final project. This pass is of no use with anything turned in after a late due date. At the end of the semester, we will apply your late pass to the program for which it will be most beneficial to your grade. Remember, however, that you only have one late pass.

- Anything handed in online after the late date will receive a No-Credit.

- Anything handed in late will not receive credit for any extra credit extensions.

- Assignments that are not given a late date and are handed in after the due date automatically receive a No-Credit.

- If you receive an NC on any assignment, you must hand in a working copy of it by the end of the semester in order to get credit for the course. Even if your course average with the NC is above the threshold for passing, you will not receive credit without submitting working versions of all assignments.

5.6 Extra Credit

Those of you who may have extra time and a strong interest in computer science are welcome to outfit your already-working programs with extra credit extensions. Additions to the original assignment can make it more useful, flashy, or user-friendly.

First, although they are extra credit, all of your programs should be designed with extensions in mind. Each program handout starting with TA SafeHouse will include a list of extensions that should be considered when designing the rest of the program.
Second, they are extra credit, and therefore to be done only after the original assignment is completed in full. You must include full documentation of your program’s additional functionality in the program header. In other words, if everything is working right, extensions will give your grade a boost, but if you did not do part of the assignment, the extensions will be worth nothing. This also means that extra credit will not be assessed for your project if you hand in a project late. This is not arbitrary; most extensions, while requiring extra work, do not teach new concepts.

Third, you may not redefine the original assignment. This means that you have to turn in a program which works according to the given specifications. We will suggest some specific extensions for the assignments, but you are more than welcome to invent your own.

5.7 Extensions, Incompletes, and Complaints

All due dates in this course will be rigorously enforced according to the mechanics described above. If you need an extension on an assignment for medical reasons or other circumstances beyond your control, you should see an HTA as early as possible before the assignment is due. No extensions will be granted on the day a program is due, barring a dean’s note. We will only grant extensions due to sickness, injury, or serious personal or family problems. We also require an official note from Health Services, your doctor, or a dean.

Incompletes in the course will only be given to a student if he/she has formal permission from a dean.

If one of your assignments has not been returned, you should see one of the HTAs and the situation will be rectified.

If you are dissatisfied with your grade on any program, you should first see the TA who graded it (the TA’s name is on the program grade report). If you still object, see one of the HTAs. Your final resort is, of course, Andy himself. In a related vein, TAs will be happy to discuss the techniques you used to design and code a program at their lab or normal hours after the program has been returned. You are encouraged to go to TA hours to get extra feedback.

If at any time you have complaints about policy or feel you have been treated unfairly, by all means, speak to an HTA. If the HTAs are unable to resolve your problem, please feel free to see Andy about what’s bothering you.

5.8 Retake Policy

If you receive an NC in CS15 or drop the course after the project DoodleJump has been released you may choose to retake the course in a subsequent semester. You will be required to resubmit all programming assignments on which you received less than an 80%. You must resubmit any new assignments which exist in the current iteration of the course. When working on and submitting projects, you must follow the current semester’s
schedule. All other grades for current assignments will be carried over from the previous enrollment. For labs, you can choose either to carry over your previous lab grade or to start over and get all labs checked off, including those you had completed during your previous enrollment. You will also be required to choose a different final project than the one you had selected previously.

If the final project is the only assignment which you must redo, and you took CS15 in the previous academic year, you may choose not to re-enroll in Banner or complete the new homework assignments, but you may not resubmit any other assignments or labs. Your final grade will be determined using your new final project score, your grades from the previous year, and the previous year’s grading distribution. Otherwise, you must re-enroll in Banner.

In either case you must email the HTAs stating your intention to retake the course. If, under this policy, you are required to re-enroll in Banner, your final grade will be calculated using the current year’s course policies and grade distributions. If you were found guilty of an Academic Code violation in CS15 in a previous year, you will not be permitted to retake the course.

6 Collaboration

CS15 has a Collaboration Policy that provides specific guidelines for what you can and cannot do in regard to working with other students. This policy is based on Brown’s Academic Code of Conduct, but it is specific to CS15. Thus, it has its own handout. You should read over the handout very carefully and complete the Collaboration Contract during your first lab.

7 Changes and Feedback

CS15 is a constantly evolving course. Changes are made in order to adapt both to technological advancements, which are inevitable in the field, and to student concerns and needs. Please give us constructive criticism on any topic, no matter how small you feel it may be - CS15 runs on your criticism! We will pay special attention to how students are doing, the comments you make, and the answers you provide on the several questionnaires that we pass out. In short, if you don’t come to us, we will assume everything is just fine, which may not be an accurate impression - so if you have any problems, please speak up!

We’d also like to emphasize that we are so happy to have any and all students enrolled in the course. We hope that CS15 is a rewarding and challenging experience. Our goal is to create an atmosphere that is inclusive to students of all backgrounds (both inside and outside of Computer Science) and encourages growth; please reach out to us if there are ways in which we can improve.