INTRODUCTION TO COMPUTER SCIENCE I
COURSE INFORMATION

Be sure to read all of this document!
Please pay special attention to Section 6 on grading.

1 The topics

A computer can carry out operations that you request at amazing speeds. The trick is learning how to instruct the machine to do your bidding. Learning a *programming language* (in this case, Java) that allows you to direct the machine is necessary and interesting, but it is **not** the focus of this course. The true focus, and the greater challenge, is determining **which** operations you want the machine to perform. Learning a language in which to express these operations is merely a side-effect of this course, albeit a useful one.

Given a particular problem that you want to solve, you first need to devise a solution. Then, you need to devise a sequence of operations that will carry out that solution—that is, an *algorithm*. Only then can you express that algorithm in some programming language, thus creating a *program*. In this course, we will tackle increasingly difficult problems for which we can create programmable solutions. Although we will only introduce you to programming and algorithmic problem solving, by its end you will have seen and used all of the basic building blocks necessary to devise and express the solution to **any** computational problem.

The basic topics are given below, roughly in the order that will we cover them. If you have no idea what some (or many) of them are, don't be alarmed—you will find out soon enough. **This course assumes no previous knowledge of programming, computing, or computers**, so few students will identify any of these terms. If you have had some programming experience, please talk to me as soon as possible. Here are the topics:

- **Storing, moving, and combining data:** *Variables* and *primitive data types*.
- **Choosing which and how many operations to perform:** *Conditional statements* and *loop statements*.
- **Making and using small, self-contained units of code:** *Methods*, *method calls*, and *encapsulation*.
- **Using simple data collections:** *Arrays*, single- and multi-dimensional.
- **Basic algorithmic strategy and analysis:** Searching, sorting, shuffling, and how long they take.
- **Basic file I/O:** *Reading* and *writing* sequences of data.
- **Basic object orientation:** Using *objects* and defining new *classes*.

This course will be project-intensive. Much of the material will seem easy enough to comprehend when presented in class, but the only way to understand this material thoroughly is to use it. That is, to truly understand a problem in depth, you must formulate an algorithm to solve the problem

and then write that algorithm in a programming language. In this manner, our projects will require you to address these problems in detail.

In this respect, **computer science is special**: the ultimate arbiter of whether your solutions and algorithms are correct is the wonderful machine that can carry out your operations and show you the result. If your work is at all flawed, you are likely to observe the consequences of that flaw; you will be able to diagnose your errors by repeatedly running your program with small variations; you will be able to verify the correctness of your solutions by testing it many ways.

2 Lectures, labs, and help

Lectures and labs: The lectures for this class are on **Monday and Wednesday** of each week, from **9:00 am to 9:50 am**, in **Seeley Mudd 206**. The labs occur on **Fridays** in **Seeley Mudd 014**, with **Section 02** meeting from **9:00 am to 9:50 am**, and **Section 04** meeting from **10:00 am to 10:50 am**.

You are expected to be present for **all of the lectures and labs**, and missing either is strongly discouraged. I will not teach material twice, so if you miss a lecture or a lab, you're on your own. If you must miss lecture or lab due to an illness or other emergency situation, contact me and we will arrange to handle the situation. **If you have a conflict** with a lecture or lab—for an athletic event, a musical or theatrical performance, or other activity, or to depart early for or arrive late from a vacation, or any other non-emergency—then **the choice is yours to miss or to attend**. If you choose to miss the class meeting, I do **not** want to know *why* nor even *that* you are missing class. You have elected, voluntarily, not to attend, and you must be prepared to obtain and learn the material that you missed on your own. I, of course, recommend that you choose to attend the class meeting when these conflicts arise. Do not underestimate the willingness of those who run extra-curricular programs to make accommodations for your academic priorities.

I expect you not only to attend lectures and labs, but also to be attentive for them. The time will be best spent if it is interactive, and that requires that you be up-to-date on the class material, and that you be alert and prepared to participate.

Office hours and meetings: If you seek assistance, reinforcement, review, or other opportunities to discuss the course material or assignments, you should see me. To do so, you should first visit the weekly office hour sign-up page. I will have one hour worth of available office-hour meetings each day, Monday through Friday. Each such hour will offer three 20-minute meeting slots. Via this sign-up page, you may select one of those slots for the current week to meet with me.

If my regular office hours are insufficient for your needs—if you are unavailable during my office hours; if there are no slots left; if you need to meet with me about something more extensive than can be addressed in 20 minutes—then you should visit my meeting request page. On this page, you will see a calendar that shows the times at which I am available (and when I am not). You may select one or more possible meeting times that fit both your schedule and mine. Those choices will be sent to me, and I will then, if possible, pick one of your proposed times.

I attempt to be highly available for meetings, whether during office hours or not. Difficult, detail-oriented questions are most quickly and effectively addressed in person. Revisiting or clarifying material from the course is likewise best done with a face-to-face meeting, allowing us to interact and address your questions and concerns directly. Please do not hesitate to see me; indeed, the

ability to do so should be one of the benefits of a small, undergraduate-focused, liberal arts college.

Email: Many questions simply do not need an in-person meeting, at least not initially. You should certainly feel free to send me email with your questions or concerns. I tend not to respond terribly quickly, but I do attempt to respond within 24 to 48 hours. You should **not** expect immediate responses, not only because I often cannot respond so quickly, but also because I believe it is important for you to stew on your question on your own. That should not stop you, though, from writing with the question. Often the act of writing is terribly useful in clarifying your own ideas; frequently my inbox contains pairs of emails from students, where the first asks a question, and then the second indicates that the student solved the problem herself.

TA sessions: The Moss Quantitative Center (a.k.a., the *Q-center*) organizes and sponsors TA sessions. These will be held each **Sunday evening from 8:00 to 10:00 pm in Seeley Mudd 014** (our usual computer lab). I strongly encourage that you work on your projects during these TA sessions, taking advantage of the opportunity to work alongside others in the class and with TA's present to answer questions and provide hints.

Tutors: If you are struggling with some aspect of the class, your first line of defense should be to **see me** (see above). However, we may find that spending additional time with a peer tutor, going over the material from lectures and working on the projects.[1] In that case, you would need to contact the Dean of Students office to request a peer tutor. They will provide you with a list of approved tutors, and you would need to contact one of those to inquire about times to meet. That tutor will then get my signed approval for the Dean's office, and then you will have dedicated help with this student who has successfully completed this course in the past.

3 Texts and materials

The text for this course will be provided online, as a PDF. It is a draft of a textbook written by Prof. Lyle McGeoch, and it will serve as a reference and reinforcement of the material covered in class. However, your primary source of material for this course is our lectures.

All other tools for this course—all of the software and documentation—will be provided. We will see, during our first lab, how to access the computer system on which you will do your programming. If you wish to use these tools (or other tools) on your own computer, you are welcome to do so. However, your work must ultimately be submitted on the provided college computer system, and I must be able to run it there. Therefore, I recommend that, unless you really know what you're doing, you stick to the software tools provided.

[1] Be cautious about project work with tutors! It is critical that they provide only conceptual feedback or hints about structuring or debugging your code. To see actual code written by the peer tutor to solve a part (or all) of a project is plagiarism, and thus to be stringently avoided.

4 Assignments, deadlines, and extensions

There will be a number of programming projects. The deadline for each will be stated clearly on the assignment, **down to the minute**. The assignment will also state the manner in which you are expected to submit or show your work. **Late submissions will receive failing grades**. Turn in what you have, and do so on time.

An extension for any assignment **must be requested, in writing** (email counts as *writing*), **at least 48 hours prior to the deadline**. The determination as to whether or not a particular situation merits an extension will be made on a case-by-case basis. Scheduled events are **not** sufficient reason to warrant an extension. Rather, extensions are intended for unusual circumstances that prevent you from planning your time well in order to meet the deadline. Note that a sudden onset of illness or other emergency situation that occurs less than 48 hours before a deadline will be treated as a special case.

5 Exams

There will be **one mid-term exam**, as well as a **comprehensive final exam**. The mid-term exam will be given during week 7 of the semester; the final exam will be a 3-hour, scheduled exam. UPDATE: The final exam is scheduled for **Wednesday, May 15, from 9:00 am to 12:00 pm, in Merrill 3.** For a few of you, this time conflicts with another of your scheduled exams, in which case you should be prepared to take this final exam on Thursday, May 16, from 9:00 am to 12:00 pm. Meet me in my office at the start of the exam to obtain the exam materials.

6 Grading

For most students, this course contains a great deal of mystery. While computers are likely familiar to you, their inner workings are not. Worse, it's not clear what *computer science* **is**: is it applied mathematics? theoretical mathematics? engineering? empirical science? The answer is that it is all of these things. Unfortunately, it is unlikely that knowing how to categorize computer science is of any help to you as you consider this course.

Because grades matter to you for good reasons—they may affect your search for a job, or your applications to professional or graduate programs—you may therefore treat this course as a risk. So much is unknown about the course material, the projects, and exams, and my expectations for your work. However, I believe that the type of thinking on which this course focuses is a major intellectual asset, and I do not want you to avoid it because of fear that your GPA may suffer for having taken an intellectual risk.

A special grading policy: Therefore, this course employs a **special grading policy** that is intended to minimize that risk. It is a policy that requires only your effort and organization; in exchange, the risk is largely removed. Specifically, this special policy is:

> If you complete all of the course work, submitting all projects and assignments on time, and demonstrating a sincere effort in all submitted work, then your final grade

for this course will be no lower than a B. If you fail to meet these requirements, then your final grade for this course will be whatever the calculation below yields.[2]

The projects and exams for this course will demand some effort from you. However, if you struggle to master the material, submitting work that is complete but flawed, you do not risk a damagingly low grade. I require only that the work be submitted by its deadline, and that all work (on projects and exams) demonstrate real effort to produce correct solutions. Clearly, *a sincere effort* is a subjective standard. However, if you put forth the effort that I expect, that effort should be unambiguously apparent to me when I grade your work. If you are uncertain whether your work will meet this standard, then simple **ask me**.

In short, if you try, and if you are organized, then you will receive at least a middling grade for this course. My hope is that this rule will leave you free to struggle with the material for its own sake, enjoying the challenges and puzzles with less distraction.

Calculation of your final grade: Your final grade will be determined by the following formula:

- 30% for the projects
- 40% for the final exam
- 20% for the mid-term exam
- 10% for **in-class participation**

Of course, the translation of the numerical outcome from this formula into letter grades will be determined within the context of the entire class's grades, as well as the special rule described above.

7 Academic dishonesty

You will be expected to do your own work on all assignments and exams in this course. While I encourage you to interact with your classmates and discuss the material and assignments, there is a limit to the specificity of such discussions. I seek to make that limit clear here.

It is acceptable to discuss any assignment for the class with a classmate. You may even discuss your approach to a particular problem, or review relevant material for a problem with another person. However, you **may not show another student your work, nor see another student's work. If in doubt, *ask me***. If you are unusure whether or not a particular kind of communication would rise to the level of academic dishonesty, then you should contact me immediately and find out.

[2] It is important to recognize that this special rule is intended to remove the risk of a poor grade **for those who put reasonable effort into the coursework**. If you fail to put in that reasonable effort, then any final grade may be possible; in other words, it becomes **possible to fail** the course.