

# Welcome to JiL Intro to Computer Science

## About these readings

Good software is *designed* to optimize the efficiency of completing a task for the user. Similarly, a high-quality academic course is *designed* for efficiency of learning. In a mobile app that keeps your daily calendar for example, the software implements an interface that is designed to optimize entering and retrieving scheduled tasks or events. For this Introduction to Computer Science course, our goal is to optimize the learning of introductory concepts and languages of computational sciences. Software designers rely on results from research in the fields of human-computer interaction and user-interface design to create an effective calendar app. In the design of our course, we rely on state-of-the-art techniques based on the latest learning science research to design a multifaceted learning system optimized toward rapidly learning complex ideas, computer languages and the skills necessary in computer science.

A critical component of this learning system is this set of readings, activities and videos. Material from this package will be assigned three 3-4 times a week. This material is meant to introduce the ideas of computer science to you. Because most 'learning' of *new* material will happen in these assignments, they are critical to success in this course. You will get the most out of the readings, the classroom meetings, and the course, if the assigned material is completed within a day of when they are assigned. During weekly meetings, we will discuss concepts introduced in the readings, expand on the concepts and most importantly, work problems designed to cement your understanding of the ideas introduced in the readings.

We understand that scheduling conflicts or an illness may sometimes get in the way of this ideal schedule. In these cases, we recommend at least screening the material for important concepts prior to our class meetings and then completing the detailed reading of the assignment as soon as possible to the day for which it was assigned. Avoid falling behind as it will be detrimental to your grade as well as to your long-term understanding of the material.

The information presented here is intended to promote 'active reading'. When reading passively, for example consuming a novel during your summer vacation, the goal is to be told a story, to be entertained. Active reading is a very different activity. When reading actively, the reader will be reorganizing or structuring information with the goal that it becomes a part of them. The active reader is constantly making ties to things she already knows so that it becomes a part of their greater understanding. Active readers are 'grokking' the material (see Definition 1.1).

As much as possible, we will facilitate active reading by providing activities and exercises designed to promote rapid understanding and assimilation of the content.

A primary difference between active

Definition 1.1 - **grok** (verb) (groks, grokking, grokked):  
understand (something) intuitively or by empathy

The [Jargon File](#), which describes itself as a "Hacker's Dictionary", puts *grok* in a programming context:

*When you claim to 'grok' some knowledge or technique, you are asserting that you have not merely learned it in a detached instrumental way but that it has become part of you, part of your identity. For example, to say that you "know" [Lisp](#) is simply to assert that you can code in it if necessary – but to say you "grok" LISP is to claim that you have deeply entered the world-view and spirit of the language, with the implication that it has transformed your view of programming.*

The book [Perl Best Practices](#) defines *grok* as understanding a portion of computer code in a profound way. It goes on to suggest that to *re-grok* code is to reload the intricacies of that portion of code into one's memory after some time has passed and all the details of it are no longer remembered. In that sense, to *grok* means to load everything into memory for immediate use.

and passive reading is pace. In technical reading, the pace is generally much slower. Fewer words are skipped and skimming is replaced in favor of re-reading more complex passages to cement understanding.

Optimally, re-reading and revisiting content at a variety of time intervals is most effective. Curriculum designers have been constructing so-called spiral or circular curriculum for years. The idea behind this design is that multiple encounters with the same material will trigger the brain into recognizing that this material is important and coaxing it to put the information into long-term memory. Additionally, encountering other related material (from later readings) may provide valuable context that will make the original reading more understandable in the second or third encounter. The main point is that by reading content a second, third and possibly a fourth time, and considering the ideas at a variety of intervals (hours, days, weeks) you will greatly improve your chances of making this material a part of your web of understanding.

When reading content multiple times, here are some guidelines for active readers:

- Read to identify and highlight important sections - it will be tempting to not highlight example problems. Please do! They are often the most important parts.
- Write your own notes - reword the material into your own message. When re-reading, edit your notes to 1) be sure the content is correct and 2) they do not contain any more or fewer words than are needed to effectively communicate the idea back to yourself. (These notes are great places to tell yourself you are awesome).
- Vary your pace. Read fast; read slowly, depending on the content. Is this technical material that I need to think about? (slowly, halting) Is this more explanatory, or material I already understand? (skim quickly)
- Quiz yourself; teach yourself; do example problems (or better yet, modified versions of the given problems) so that you can easily do them yourself.
- Can I think of examples that would use this? Is there a mobile app I use often that might use this idea? Is there an app I would like to create that could use this?
- Change your environment.
  - A) Different locations  
Read inside, outside, upside down. Read in quiet places, noisy places, crowded places, lonely places.
  - B) Different people  
Read along; read with your friends, read with your enemies. Better yet, read with enemies who you have made your friends. Best yet: when reading with someone else, have each other express the ideas in your own words. Teach the idea to each other.

## **Manage lapses in concentration**

Singular focus on a task has been shown to increase happiness. Seriously! The time spent on these course readings should be efficient, directed and focussed so that, besides saving time for other endeavors, you will increase your happiness. We have made this content available in a mobile-friendly environment so it can be used anywhere. If your current environment is not conducive to focus, go someplace else. Use the "do not disturb" settings on your device to eliminate interruptions from email

and text messages while you are actively reading. Even with these provisions, distractions will occasionally occur. Tend to these interruptions, then come back - addressing distractions is not a sin. There are more important things in life than the material presented here - although we can't think of any offhand (we joke).

## **Read like a scientist**

You won't always need to re-read entire chapters of content. Sometimes getting a feel for the content of a section is enough to remind you of all the content contained therein. Reading the introduction and the conclusions is often enough to allow you to quiz yourself on the content. If you are able to sufficiently recall and use the information in the chapter, that refresher should be enough time spent reviewing. Surveys consistently report that scientists will often read the abstracts and conclusions of research paper and possibly glance at the figures to get a flavor for what the research is about before deciding to read the entire manuscript for the details. Your personal notes on a section should play a similar role to an abstract in your reviewing of material.

As you progress through the readings in this course (and any other future courses), you may wish to adopt the SQ3R sequence developed by Francis Robinson at Ohio State. For optimum comprehension when actively reading assignments, this approach suggests you Survey, Question, Read, Review, Recite (SQ3R):

- **Survey:** Develop an overview that can guide you on what you can skim and what will require slower reading. By glancing through the section or chapter for headings and flow indicators, you can develop an outline to determine the organization of the content that will guide the more detailed reading.
- **Question:** Ask yourself what this chapter is about. What do I know about this already? What don't I understand? Good active readers are continually asking and answering questions as they read. What is this page about? What is the key idea? What facts or examples support it? How is it organized?
- **Read:** Read the content with the goal to summarize the chapter with sparse notes on key ideas and support. The main idea is to reduce a chapter into one, or two pages of notes. Note taking is helpful tool for concentration. Try to come up with quiz questions (and answers to those questions) as part of your notes.
- **Review:** On a subsequent day(s), review your notes. If the notes you have are not clear, review the portion of the reading related to those notes and revise your notes so that they will be clear and complete enough to remind you of the key ideas the next time you review. Cycling back over the material again and again, and quizzing yourself on the material, even if you get it wrong, is a trigger to your brain that this content is something you will need to retrieve again and again. The brain's response is to move the ideas from the pages you are reading into your long-term memory.
- **Recite:** Recite or teach the material to yourself or to someone else. Practice teaching each concept to someone else. The act of explaining material requires you to organize it in a way that fits into your current knowledge web. Think of the recitation process as you taking ownership of the idea giving your brain the permission and imperative to incorporate the concepts as its own.

Remember, while actively reading content in this and other computer science courses, we are not passively consuming the content, but instead grokking the techniques and ideas that encompass computer science. The ideas and techniques presented here will go a long way toward that goal.