INFO 6205
Program Structure and Algorithms

Prof. Robin Hillyard

What this course is about?

- Should I use a stack or a queue?
- Which kind of symbol table should I be using?
- What's the fastest sort algorithm?
- How to find the best route from A to B using a street map?
- How to prepare for the *coding interview*?

Are you in the right place?

- If you aren't interested in the answers to the questions in the previous slide (or you already know all the answers)…
- This class is not for you!

About me

- B.A/M.A Engineering Science (Oxford) (1st Class) 1973
- Ph.D. Computer Science (Cambridge) 1978
- 50 years of programming
- 5 years of teaching at Northeastern, including two years as full-time professor.

About me (contd.)

- Worked in:
  - First paid programming job: 1969 researching natural gas combustion
  - Computer-aided design (“Solid Modeling”, “Surface Modeling”) (Pascal, Algol68)
  - Artificial Intelligence/Machine Learning/NLP (Lisp, Java, etc.)
  - Object-relational database design (C)
  - Document Management (C, C++, OPL, Perl, Java)
  - Finance (Java)
  - eCommerce (Java, ColdFusion, Javascript, Groovy)
  - Healthcare
    - Privacy, security, crypto, anonymization (Java)
    - Reactive programming (Java, Scala)
    - Big-data analysis with Hadoop/Spark/GraphX/ElasticSearch (Pig, Java, Scala)

Contact Info, etc.

- Slack team*: https://info6205spring2020.slack.com
  - Please use this for all regular correspondence;
  - Use the #general or #assignments channel as appropriate;
  - Use direct channel only for confidential conversations.
- Email: r.hillyard@northeastern.edu (for formal, *non-urgent* requests)
- Blogs: http://robin-hillyard.blogspot.com (Java); http://scalaprof.blogspot.com (Scala);
- Github: https://github.com/rchillyard
- LinkedIn: https://www.linkedin.com/in/robinhillyard
- Twitter: @Phasm1d

* *best way to contact me (team name might not be exactly this)*

More about me

- 1968: wrote my first program (50+ years ago!!)
  - solve *sech(x)=x* (in Fortran)
  - it worked first time.
- 1969: wrote my first driver (for a plotter) as well as first use of a “personal computer”
- 1972: wrote my first debugger (for Assembly language).
- 1983: wrote (my) first object-relational database.
- 1984: wrote my first unit-test runner.
- 1994: wrote my first Java program.
- 2012: wrote my first Scala program.

About you…

- Backgrounds?
- Programming classes?
- Programming jobs?
- HackerRank?
- Java? Java8?
- Functional Programming?

How will we proceed?

- Assignments: assignments are designed to challenge you a little. They tend to be experimental—not simply regurgitating algorithms/data structures you found on the internet.
- Quizzes: These will normally be conducted weekly using HackerRank at the end of a lecture. The subject matter is always from the lecture just finished—or, perhaps, the previous lecture. Almost half of the quizzes will not count. Usually, we do 11 quizzes but we don't have to do that many.
- Project: Team project: weeks 10-13 (approximately).
- Labs: There will be a couple of labs in the first half of the class.
- Mid-term exam, Final exam: to be scheduled. Please see *Guidelines for Exams* in the *Course Materials*.

My best advice

- Pay attention in class. Especially if I say “this is really important!” That’s code for “it’s very likely to be in the exam.”
- Read the textbook, especially for detail and proofs.
- Practice, practice, practice problem solving with HackerRank, LeetCode, etc.

The textbook

- We will be using Sedgewick and Wayne, Fourth Edition.
  - Sedgewick didn’t invent Quicksort but he popularized it and improved its efficiency.
- There are lots of other good textbooks on algorithms and data structures if you want to get a wider perspective.

Lecture Materials

- Slides with a white background are from Kevin Wayne's classes (with permission).

- All the other slides are my own material.

Exams

- My exams might be a bit different from those of other professors. I emphasize questions which try to test your *understanding*, <u>not</u> your memory.
- They might be a bit harder, too.
- If an exam is “open-book,” I work really hard to come up with questions that you can’t just look up on the internet.
- I give you lots of guidelines (see document on Blackboard) to follow.

Grading

- Assignments (17%): There will be five (or six) assignments. The last of these is usually a team assignment. You get one “free” assignment (not including Assignment0).
- Project (22%): You will have three weeks to work on the (team) project (during which time there will be no other assignments). Please see Blackboard for more details.
- Quizzes (18%): There will probably be 11 quizzes, of which your best 6 will count. These will normally be conducted using HackerRank at the end the Thursday/Friday lecture. Once you’re finished, you’re free to go if you don’t disturb others. Avoid switching out of the HR page and/or copying other’s answers.
- Mid-term exam (17%): Closed book (harder than you expect).
- Final exam (22%): open-book Blackboard/ closed-book Hacker-Rank
- Class Participation (4%): TopHat

Grading (contd.)

- I try to give out grades based on your absolute performance, not just your relative performance in your class.

- I've been doing this long enough to know what grade you deserve.

Conduct

- Integrity: Academic integrity is **expected** and **required** from all students.
  - I want you to take this seriously! Do *not* work as a team unless an assignment is a team assignment. Do not plagiarize. You *will* get a lower grade if I catch you out. You might even get an F.

- Attention: Your attention is *required* at all times during lectures. Laptop computers are, of course, a boon to students. Especially if you need to look up unfamiliar words. But, if you can't resist spending your time on Snapchat, Facebook, Angry birds, whatever, *close the lid!* Seriously!!

- One more thing: The majority of my students are *quiet* in class and pay attention. If you think that my classroom is the place to swap gossip and disturb me and the other students, I will ask you to leave.

What if you fall behind?

- Two apparent options:
  - Do nothing until the end of the semester and ask me to improve your grade*;
  - Let me know what's happening and ask to get some extra help.

* not going to work!