

Welcome!

Math 42

Differential Geometry I

Just Kidding! :)

Math 42

Differential Geometry I

CS 10

Problem Solving via Object Oriented Programming

www.cs.dartmouth.edu/~traviswp/cs10/



- Travis Peters
- 2nd Year PhD Student
- Research: mHealth Security & Privacy
- Home: Washington (kind of)
- B.S. Mathematics & Computer Science
- Fun: Running, Basketball, Amateur Woodworker and Cyclist, Netflix enthusiast, ...

CS 10

Problem Solving via Object Oriented Programming

www.cs.dartmouth.edu/~traviswp/cs10/

Plan for Today

- What's this course about?
- Administrative stuff
- Getting started

What's this course about?

- “Problem Solving via Object Oriented Programming”?
- 3 Components:
 - Advanced Programming - *GUI, networking, etc.*
 - Data Structures - *how to efficiently organize data*
 - Algorithms - *procedures for solving problems*
- Problems: process images, play games (webcam), build a collaborative graphical editor, compress files, play the Kevin Bacon game, ...
- Techniques: representation, abstraction, encapsulation, modularity, recursion, and concurrency, ...

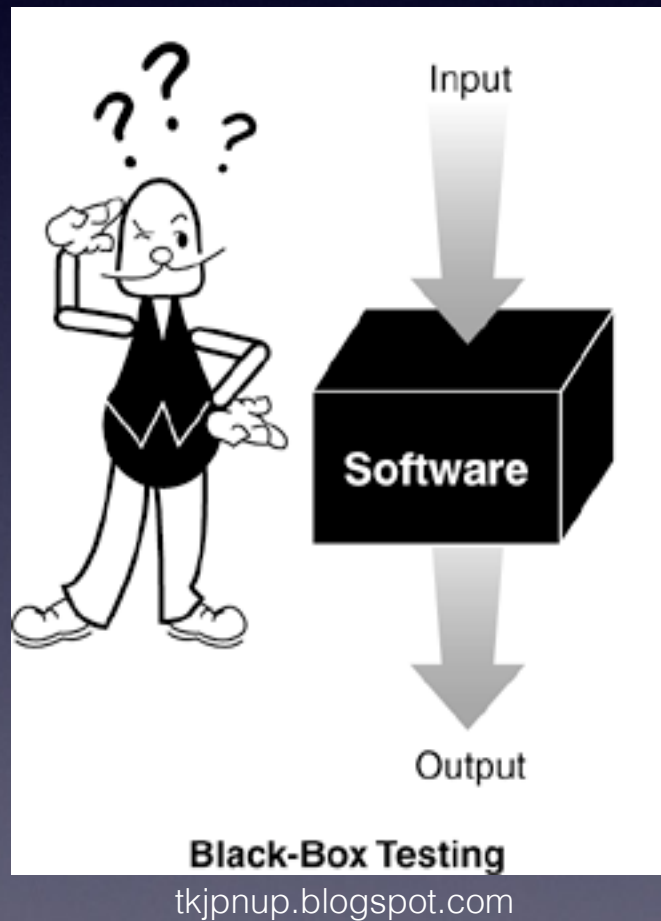
What's this course about?

(cont.)

- Abstraction (1-2-3):
 1. Identify a pattern or interaction (computational or otherwise).
 2. Give it a name.
 3. Define its interface (i.e., describe inputs/outputs and their relationships to each other)

What's this course about? (cont.)

- Ex. Square root



9
sqrt(9)
3

What's this course about? (cont.)

- Ex. Driving an automobile



<http://i.telegraph.co.uk/>



<http://www.kiplinger.com/>

What's this course about? (cont.)

- Ex. Computers!



homeasnika.com/

<http://www.imacula.co.uk>

What's this course about?

(cont.)

- How do we define our abstractions?
- [Enter Java!]
 - Object Oriented (OO)
 - Simula
 - The first OO language
 - express simulations in terms of interacting objects
 - Lion King: <https://www.youtube.com/watch?v=2m-42ek85G4>

What's this course about?

(cont.)

- Objects
- Each object usually has:
 - Some data or information that they “know”
 - “instance variables” or “state”
 - Some actions that they can perform when asked, usually involving the data they hold.
 - “methods”
- Why is Java good for abstraction?
 - private data
 - public methods
 - “Classes” == modularity and encapsulation
 - “Interfaces” == abstraction

What's this course about?

(cont.)

Abstract Data Types (ADTs) & Data Structures

- Abstract Data Types (ADTs)
 - collections of operations (add, delete, etc.)
 - ex. lists, sets, dictionaries, maps, stacks, queues, graphs, etc.
- Data Structures
 - concrete ways of representing data
 - ex. arrays, linked lists, binary search trees, hash tables, etc.
 - arrays are used in implementations of a lot of ADTs!
 - we will look at tradeoffs of choosing one data structure or another to implement some ADT.

Administrative Stuff

<http://www.cs.dartmouth.edu/~traviswp/cs10/syllabus.html>

- Canvas: has everyone gotten an invitation and/or can access our Canvas site?!
- SA0 out
- Schedule linked from our main CS 10 webpage
- X-Hour this Thursday

Getting Started

- Course software
 - Java, Eclipse, JavaCV
- Road map (today and this week)
 - Today and Wednesday, I'll start to introduce some of the java ideas, concepts, and syntax that you need to get started. We will jump into some interesting and (hopefully fun) code where we learn about basic Java program structure, images, how images are represented, how you can play with them, etc.
 - Thursday at the x-hour, I'll take a step back, dive a little deeper into some of the core Java ideas and concepts that ARE NOT tangled up in GUI programming and basic event programming.
 - This week: lots of "boiler-plate" -- a lot of it isn't stuff I expect you to have memorized by heart (I still look a lot of it up myself). But I do expect you to understand what it is doing when you see this code.
- Let's get in the code!