Introduction to CS5046
Objects and Classes

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What is CS5046?

- Second introductory CS course for life scientists without a CS background.
- CS5046 is the continuation of CS5045.
- In CS5045, you learnt basic programming skills using Perl.
- In CS5046, we will use Java as a means to learn
  - object-oriented programming and software engineering,
  - design, analysis, and implementation of fundamental data structures and algorithms, and
  - special topics in bioinformatics of interest to life scientists.
Goals

- Sound knowledge of object oriented programming principles.
- Ability to assess the algorithm/data structure needed to solve a problem.
- Ability to implement a small software system in Java to solve bioinformatic tasks.
Course Info

- **Textbooks**
  - *Objects First with Java Using BlueJ*, Barnes and Kölling.

- **Course web site** [http://people.cs.vt.edu/~murali/teaching/cs5046/cs5046.html](http://people.cs.vt.edu/~murali/teaching/cs5046/cs5046.html)

- **Listserv:** CS5046_16276@listserv.vt.edu

- **Office hours:** 9-11AM, Tuesdays and by appointment, Torgerson 2160B.
Course Policies

- Course grading

<table>
<thead>
<tr>
<th>Homeworks</th>
<th>30%</th>
<th>≈10</th>
<th>Due at start of class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm 1</td>
<td>20%</td>
<td>February 23</td>
<td>Written, in class</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>20%</td>
<td>April 7</td>
<td>Written, in class</td>
</tr>
<tr>
<td>Final project</td>
<td>30%</td>
<td>Due on May 5</td>
<td>Small–midsize software project</td>
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- Submit homeworks by start of class on the due date.
- Each class has required reading. Please consult course web page.
- I will assign the final project to each student by the end of February.
What is Java?

- Invented by computer scientists from Sun Microsystems in the early 1990s.
- Language designed for object-oriented programming.
- “Language for the internet.”
- Cross-platform: write once, run everywhere.
Fundamental Concepts

- Object
- Class
- Method
- Parameter
- Data type
- Object state
Objects and Classes

- **Object**: represents “things” from the real world or from some problem domain (example: my car, this classroom, Heat Shock Protein 70, the GenBank record for HSP70).

- **Class**: represents all objects of a type (e.g., cars, rooms, proteins, GenBank records)
Methods and Parameters

- We can “talk” to objects by invoking operations on them (methods in Java).
- Methods can have parameters that pass additional information for the object to use when executing the method.
- Parameters have types.
Other Observations

- We can create multiple instances of objects from a single class.
- Each instance/object has attributes. We store their values in fields.
- The class defines the fields of each object belonging to that class but each object has its own set of values, the state of the object.
Getting Started

- Install Java2 Standard Edition (J2SE) Software Development Kit (SDK) 1.4.2
  
  http://java.sun.com/j2se/1.4.2/download.html

  without the NetBeans IDE.

- Install J2SE v 1.4.2 documentation.

- Install BlueJ version 1.3.5
  

- Directions on course web site.

- Installation should work on Linux/Macs/Windows/Solaris ...
Getting Familiar with BlueJ

- IDE developed with teaching in mind by professors at Monash University in Australia.
- We will use BlueJ for a large part of the course.
- Open a project
- Compile a project
- Classes and objects
- Creating instances
- Calling methods without and with parameters
- Parameter types and values
- Class inspector
- Object state