Who am I?

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Interests: Emotions in Computing, Computer Based Tutoring, Artificial Intelligence, Machine Learning

CMSC 110-02: Introduction to Computing
Spring 2016

Course Website (Syllabus): http://cs.brynmawr.edu/cs110dc
Assignment: Read the Syllabus for Monday and ask questions

Instructor:
David G Cooper, Ph.D. (dgc@cs.brynmawr.edu)

Grading
- 7 Assignments: 45%
- Exam 1: 20%
- Exam 2: 35%
- Total: 100%

Software
Processing 2.X
- Already installed in the CS Lab
- Also available for your own computer @ www.processing.org
- Processing == Java

Book
Creative Coding & Generative Art in Processing 2 by Ira Greenberg, Dianna Xu, Deepak Kumar, friends of Ed/Apress, 2013. Available at the Campus Bookstore or amazon.com or other vendors.

Class Lottery

- Make sure to sign-in your name.
- If you are not “in” the lottery, indicate that. We will contact you by e-mail as soon as we have confirmation from other students.

What is Computing?
Computing: Productivity...

Computing: internet, e-mail, social network...

Computing: Digital Photography

Computing: Entertainment...

Computing: Games...

What is Computer Science?

- The study of computation
- We do this through
  - algorithms (theory/math)
  - applied algorithms (programming and hardware)
  - experimentation (running programs in different conditions)
“Computer science is no more about computers than astronomy is about telescopes”

- Edsger Dijkstra

**Areas in Computer Science**

- Artificial Intelligence
- Robotics
- Human-Computer Interaction
- Computer Graphics
- Computer Vision
- Operating Systems
- Computer Networking
- Databases
- Computer Security
- Ubiquitous Computing

**Artificial Intelligence**

- Roomba
- Google Autopilot car
- Mars Rover

**Graphics**

- 3D Representation of the Heart
- The Incredibles from Pixar

**Organization of Data, and Searching**

**Educational Technology**

- I'm tired of this topic
- Accuracy
  - Pretest: 55%
  - In Tutor: 80%
  - Motivation: Low
What is Computer Science?

- Computer science is the study of solving problems using computation
- Computers are a part of it
- The emphasis is on problem solving

What can be programmed?

How do you program?
What is a Computer Program?

A collection of human readable statements that can be translated to machine instructions and executed by a computing device.

Algorithms

An algorithm is an effective method for solving a problem expressed as a finite sequence of instructions. For example,

- Put on shoes
  - left sock
  - right sock
  - left shoe
  - right shoe

Programming = Writing Apps

Programming is the process of designing, writing, testing, debugging / troubleshooting, and maintaining the source code of computer programs. This source code is written in a programming language.

Computer Programs

<table>
<thead>
<tr>
<th>Plain English:</th>
<th>Pseudo-code:</th>
<th>Processing Code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display text “Hello, World!” on the console.</td>
<td>print “Hello, World!”</td>
<td>println(“Hello, World!”);</td>
</tr>
</tbody>
</table>

- Note that processing uses a semi-colon (;) instead of a period.
- Also note that parameters to functions are always in parentheses

A program

```java
int areaOfCircle(int radius){
    return PI*radius*radius;
}

setup(){
    r = 10;
    area = areaOfCircle(r);
}
```

Creative Introduction to Computing
Our Goal

- Use computing to realize works of art
- Explore new metaphors from computing: images, animation, interactivity, visualizations
- Learn the basics of computing
- Have fun doing all of the above!

Examples

Word Clouds

Aquarium
Let’s get started…

How should we use this book?

Processing 2.0 IDE

Processing Preferences (no updates)

Primitive 2D Shapes

- point
- line
- triangle
- rect (rectangle)
- quad (quadrilateral, four-sided polygon)
- ellipse
- arc (section of an ellipse)
- curve (Catmull-Rom spline)
- bezier (Bezier curve)
Language Environment

Reference: The Processing Language was designed to facilitate the creation of sophisticated visual structures.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Stage</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>p() (push)</td>
<td>push</td>
<td>none</td>
</tr>
<tr>
<td>pop()</td>
<td>pop</td>
<td>none</td>
</tr>
<tr>
<td>begin()</td>
<td>begin</td>
<td>none</td>
</tr>
<tr>
<td>end()</td>
<td>end</td>
<td>none</td>
</tr>
<tr>
<td>begin()</td>
<td>begin</td>
<td>none</td>
</tr>
<tr>
<td>end()</td>
<td>end</td>
<td>none</td>
</tr>
<tr>
<td>size(width)</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>background(gray)</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>ellipse(width/2, height/2, 200, 200)</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

Processing Canvas

```
size( width, height );
```

Set the size of the canvas.

```
background( [0..255] );
```

Set the background grayscale color.

Coordinate System

```
line( 10, 10, 50, 80 );
```

Anatomy of a Function Call

Function name Parentheses Arguments Statement terminator

Viewing your sketch folder
Viewing your sketch folder

Drawing Primitives

- `point(x, y);`
- `line(x1, y1, x2, y2);`
- `triangle(x1, y1, x2, y2, x3, y3);`
- `quad(x1, y1, x2, y2, x3, y3, x4, y4);`
- `rect(x, y, width, height);`
- `ellipse(x, y, width, height);`

Smooth() vs. noSmooth()

Colors

Composed of four elements:
1. Red
2. Green
3. Blue
4. Alpha (Transparency)

Shape Formatting

1. Fill color
2. Line thickness
3. Line color

These are properties of your paintbrush, not of the object you are painting.

Why 0 .. 255?
Fill Color

```java
fill(gray);
fill(gray, alpha);
fill(red, green, blue);
fill(red, green, blue, alpha);

noFill();
```

Stroke (Line) Color

```java
stroke(gray);
stroke(gray, alpha);
stroke(red, green, blue);
stroke(red, green, blue, alpha);

noStroke();
```

strokeCap()

```java
smooth();
strokeWeight(12.0);
strokeCap(ROUND);
line(20, 30, 80, 30);
strokeCap(SQUARE);
line(20, 50, 80, 50);
strokeCap(PROJECT);
line(20, 70, 80, 70);
```

strokeWeight()

```java
smooth();
strokeWeight(1); // Default
line(20, 20, 80, 20);
strokeWeight(4); // Thicker
line(20, 40, 80, 40);
strokeWeight(10); // Beastly
line(20, 70, 80, 70);
```

ellipseMode

```java
ellipseMode(CENTER);
ellipse(35, 35, 50, 50);
ellipseMode(CORNER);
fill(102);
ellipse(35, 35, 50, 50);
```

rectMode

```java
rectMode(CENTER);
rect(35, 35, 50, 50);
rectMode(CORNER);
fill(102);
rect(35, 35, 50, 50);
```

Assignment Submission

- [www.dropbox.com](http://www.dropbox.com)