CMSC 110
Introduction to Computing

Section 02
David Cooper

Who am I?

David G Cooper, PhD

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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)

Lectures
MW 11:40PM-1:00PM in Park 336

TA-Support
>20 hrs/week in Park 231

Labs
W 1:00pm – 3:00pm in Park 231

Grading

• 7 Assignments	45%
• Exam 1	20%
• Exam 2	35%
Total	100%

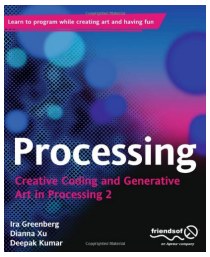
Software

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, friendsofEd/APress, 2013. Available at the Campus Bookstore or amazon.com or other vendors.

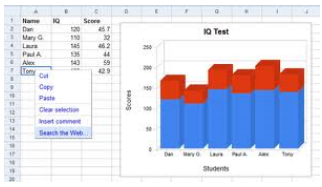


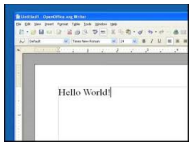
Class Lottery

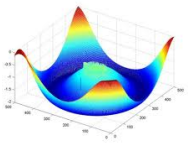
- Make sure to sign-in your name.
- If you are not "in" the lottery, indicate that. We will contact you by e-mail as soon as we have confirmation from other students.

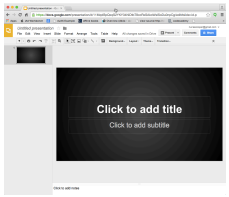
What is Computing?

Computing: Productivity…







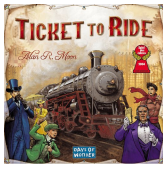


Computing: internet, e-mail, social network…

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

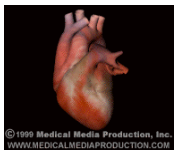
Artificial Intelligence


Roomba


Google Autopilot car


Mars Rover

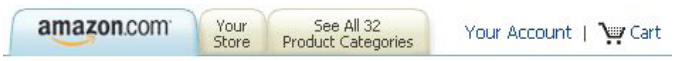
Graphics



3D Representation of the Heart


The Incredibles from Pixar

Organization of Data, and Searching

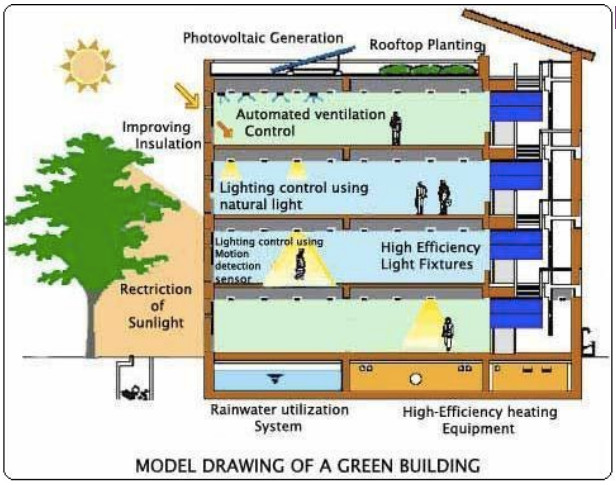


Educational Technology

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?



MODEL DRAWING OF A GREEN BUILDING

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

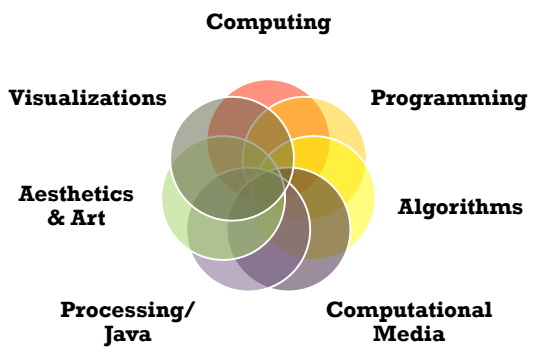
Plain English:	Psuedo-code:	Processing Code:
Display text "Hello, World!" on the console.	print "Hello, World!"	println("Hello, World!");

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

A program

```
int areaOfCircle(int radius){
  return PI*radius*radius;
}
setup(){
  r = 10;
  area = areaOfCircle(r);
}
```

Creative Introduction to ^ Computing

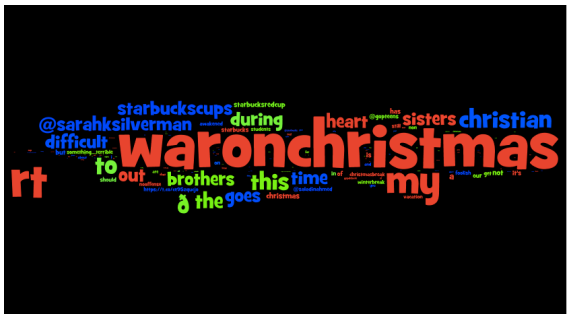


Our Goal

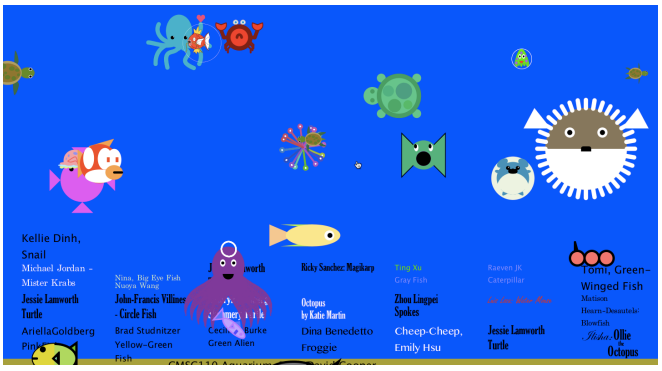
- Use computing to realize works of art
- Explore new metaphors from computing: images, animation, interactivity, visualizations
- Learn the basics of computing
- Have fun doing all of the above!

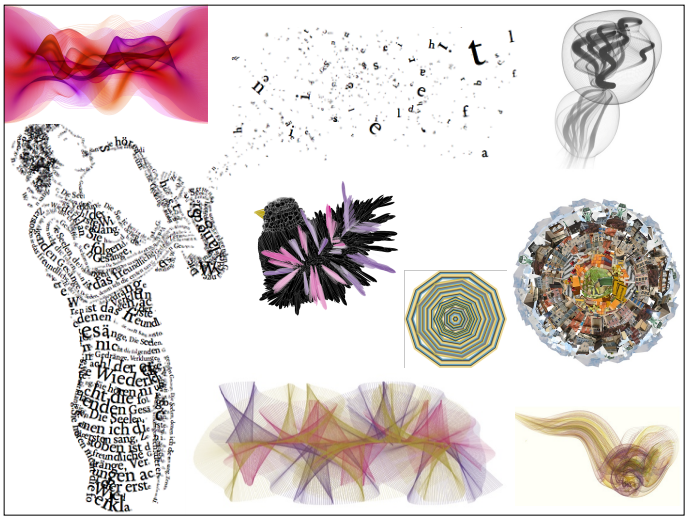
Examples

Word Clouds



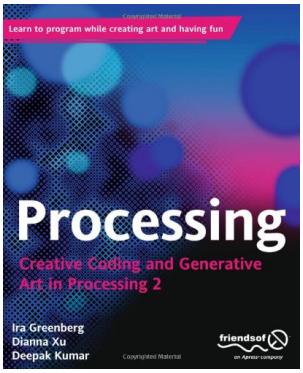
Aquarium



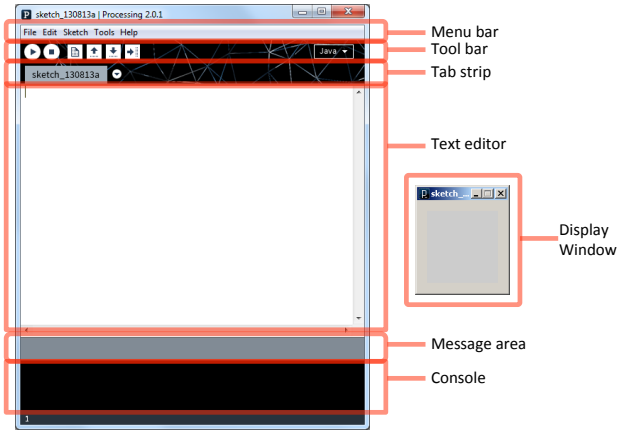


Let's get started…

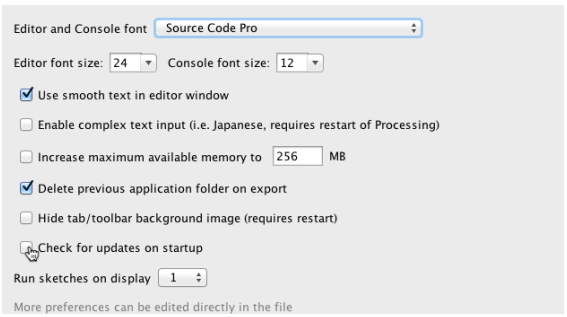
How should we use this book?



Processing 2.0 IDE

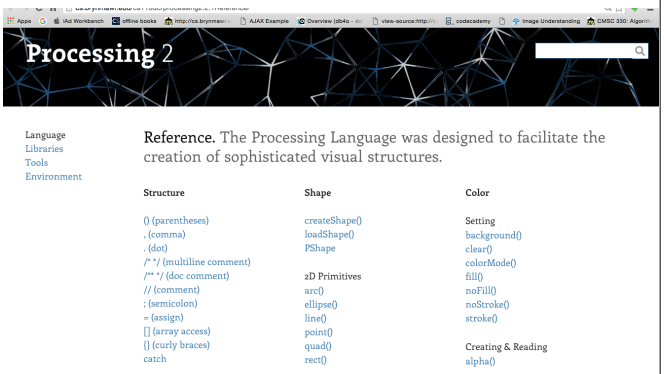


Processing Preferences (no updates)



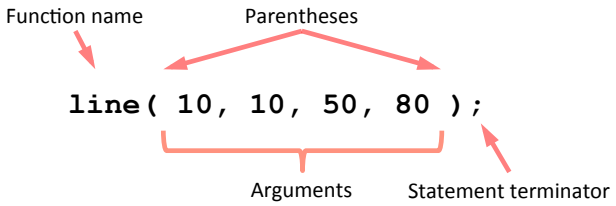
Primitive 2D Shapes

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

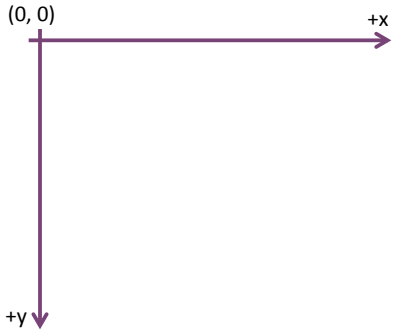


http://cs.brynmawr.edu/cs110dc/processing2.2.1Reference/

Anatomy of a Function Call



Coordinate System



Pixels

Processing Canvas

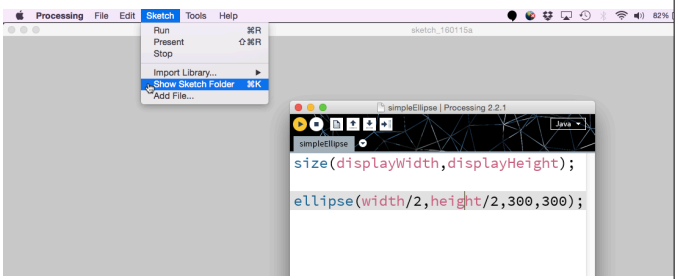
`size( width, height );`

Set the size of the canvas.

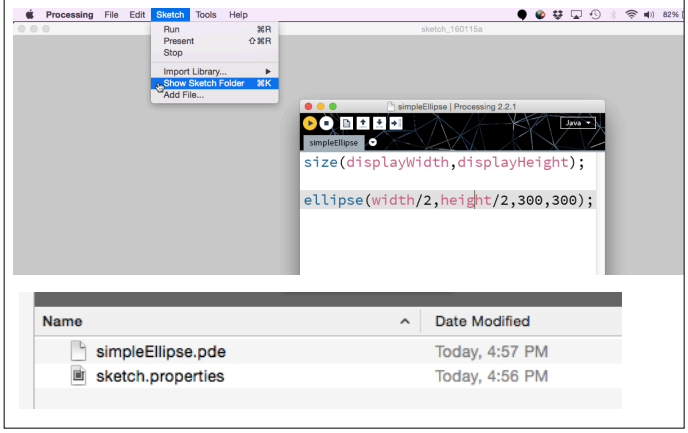
`background( [0..255] );`

Set the background grayscale color.

Viewing your sketch folder



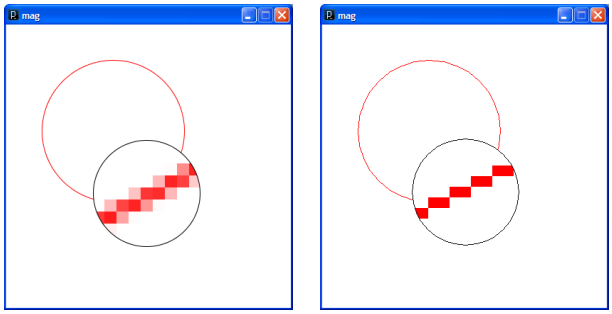
Viewing your sketch folder



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

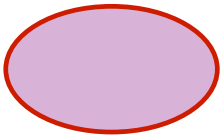
Composed of four elements:

1. Red
2. Green
3. Blue
4. Alpha (Transparency)

Why 0 .. 255?

Shape Formatting

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



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

Fill Color

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

noFill();
```

Stroke (Line) Color

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

noStroke();
```

strokeCap()

```
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()

```
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);
```

http://processing.org/reference/strokeCap_.html
http://processing.org/reference/strokeWeight_.html

ellipseMode

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

rectMode

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

http://processing.org/reference/ellipseMode_.html
http://processing.org/reference/rectMode_.html

Assignment Submission

- http://www.dropbox.com