Who am I?
David G Cooper, PhD
Visiting Assistant Professor
Computer Science Department
Bryn Mawr
Office: 249 Park
Email: dgc@cs.brynmawr.edu
Interests: Emotions in Computing,
Computer Based Tutoring, Artificial Intelligence,
Machine Learning

Administrivia
CMSC 110: Introduction to Computing
Fall 2015

Course Website (Syllabus): [http://cs.brynmawr.edu/cs110dc](http://cs.brynmawr.edu/cs110dc)
Assignment: Read the Syllabus for Wednesday and ask questions
Instructor:
David G Cooper, Ph.D. (dgc@cs.brynmawr.edu)

Lectures
MW 2:40PM-4:00PM in Park 338

Grading
- 7 Assignments: 56%
- Exam 1: 18%
- Exam 2: 26%
Total: 100%

TA-Support
>20 hrs/week in Park 231

Open Labs (Optional)
(Tue Morning?) in Park 231

Software
Processing 2.X
- Already installed in the CS Lab
- Also available for your own computer @ [www.processing.org](http://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, network...
Computing:

- Digital Photography
- Entertainment...
- 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

Medical, Genomics Applications

Educational Technology

What is Computer Science?

Computer science is the study of solving problems using computation

- Computers are part of it, but the emphasis is on the problem solving aspect

Computer scientists work across disciplines:

<table>
<thead>
<tr>
<th>Field</th>
<th>Field</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Geosciences</td>
<td>Medicine/Surgery</td>
</tr>
<tr>
<td>Biology (bioinformatics)</td>
<td>Archeology</td>
<td>Engineering</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Psychology</td>
<td>Linguistics</td>
</tr>
<tr>
<td>Physics</td>
<td>Sociology</td>
<td>Art</td>
</tr>
<tr>
<td>Geology</td>
<td>Cognitive Science</td>
<td></td>
</tr>
</tbody>
</table>

I'm tired of this topic

Accuracy

Pretest: 55%  
In Tutor: 80%

Motivation: Low
Computing is important

Huge Growth in Computing-Related Jobs

Total Annual U.S. STEM Jobs Thru 2020 vs College Grads

- Job Openings
- Bachelors Degrees Awarded

Strong Earnings Potential

Salaries of Bryn Mawr Graduates

- Computer Science Dept
- All Science Depts
- College Average

Average Individual Annual Income

Office of Institutional Research, Planning, and Assessment
Bryn Mawr College
...many different companies ... need to hire computer scientists. They aren’t tied to one particular industry.

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

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

Shepard Fairey
Abstract Art

Lyrics by George Gershwin

Summertime
And the livin' is easy
Fish are jumpin'
And the cotton is high

Your daddy's rich
And your mamma's good lookin'
So hush little baby
Don't you cry

One of these mornings
You're going to rise up singing
Then you'll spread your wings
And you'll take to the sky

But till that morning
There's a nothing can harm you
With daddy and mamma standing by

Summertime,
And the livin' is easy
Fish are jumpin'
And the cotton is high

Your daddy's rich
And your mamma's good lookin'
So hush little baby
Don't you cry

Word Cloud

Created using wordle.net
World Cloud

President’s Inaugural Addresses

Map-based
Our Goal

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How to Use the book

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Let's Draw!

Coordinate System

![Coordinate System Diagram](image)

**Primitives 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)

Processing 2.0 IDE

![Processing IDE Diagram](image)

http://processing.org/reference/
**Anatomy of a Function Call**

- Function name: `line( 10, 10, 50, 80 );`
- Parentheses: `();`
- Arguments: `10, 10, 50, 80`
- Statement terminator: `;`

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**Coordinate System**

- Origin: 
- Axes: +x, +y
- Point: (0, 0)

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**Processing Canvas**

- `size( width, height );`
  - Set the size of the canvas.

- `background( [0..255] );`
  - Set the background grayscale color.
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 );

Colors

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

smooth() vs. noSmooth()
Homework

- Go the CS Computer Lab (Room 231 PSB)
- Log in
- Start the Processing application
  (Make sure it is Version 2.x)
- In a web browser, go to the Tutorials section of processing.org
  http://www.processing.org/tutorials/gettingstarted/
- Read the Getting Started tutorial (by Casey Reas & Ben Fry) and try out the two examples of simple Processing programs presented there
- If you’d like, install Processing 2.x on your own computer
- Read Chapter 1 (Read pages 1-12, skim 12-32)