SMS 416 -- a hands-on class on:

- •Programming 3.5 weeks (+)
- •Sensors -3.5 weeks (+)
- Robotics 7 weeks

Class has been implemented recently in computer science as COS120. Check out

at: http://umaine.edu/computingcoursesonline/cos120/class-sessionsand-assignments/#ICM

First and apology

I am the lead of the science team for the upcoming NASA PACE satellite (<u>https://pace.gsfc.nasa.gov/</u>)

Our annual face-to-face meeting is this week.

But, as you will come to see, you can learn it all w/o me...



Why SMS 416?

Programming - without it, we cannot make 'things' (e.g. sensors, robots, your cell phone) do what we want them to do.

•Sensors - they are our contact to the environment (the ocean as well as the lab).

•Robotics - the actual machine that do the work for us (DNA sequences as well as take samples in the oceans).

Course mechanics:

- 1. Project oriented. Self driven.
- 2. Blog Provides near-real-time feedback and self reflection.
- We encourage you to work together (groups of maximum 3, though 2 seems best) and help each other (including people in other groups).
- You are expected to come to class every class day (it is OK to leave early if you need to). Between me and Jim, somebody will always be here to help.
- 5. All information is available at: <u>http://misclab.umeoce.maine.edu/boss/classes/SMS_416/Syllabus_SMS416.html</u> - including this talk
- 6. This class is **flexible**. If you have a project **you** would like to do (within the general course subjects), we can tailor the class to accommodate your desires by purchasing the needed materials.

"Hidden" agenda:

We would like all of you, by the end of the class, to have the feeling that YOU can learn and do whatever you set your mind on.

Given the amount of material currently available on-line, the sky is the limit.

We believe in sharing. For example, learning is much faster when we use an already written piece of code that does A to do B. So feel free to borrow extensively but don't forget to share what you come up with in return.



Today:

A short introduction to programming.

Visit lab.

Start working on 1st programming project.

Laptops: do you need one from us?

If you have no background in electronics, we have in the lab an Elenco 'snap-it' set that will help you get some basic understanding. You are welcome to come and play with it.



What is programming?

From the WWW:

programming: creating a sequence of instructions to enable the computer to do something.

Computer programming (often shortened to programming or coding) is the process of writing, testing, debugging/troubleshooting, and maintaining the source code of computer programs.

This source code is written in a programming language. The code may be a modification of an existing source or something completely new.

The purpose of programming is to create a program that exhibits a certain desired behavior.

The process of writing source code often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.

Common aspect of all programming languages

Paraphrasing Allen Downey, in his book <u>How To Think Like A Computer Scientist</u> (more at https://en.wikipedia.org/wiki/Computer_programming):

The instructions making the program look different in different programming languages, but there are a few basic operations most languages can perform:

input: Get data from the keyboard, or a file, or some other device.

output: Display data on the screen or save data to a file or other device.

Operations: Perform basic operations like addition and multiplication or motion of an object on the screen.

testing: Check for certain conditions and execute the appropriate sequence of statements based on whether the condition is true of false.

repetition: Perform some action repeatedly, usually with some variation.

We will use 'Scratch' to learn these basic concepts of programming (you will continue and program using other languages in the rest of the class).

About Scratch:

A product of MIT.

Is free and easy to share (> 19,000,000 example programs available online).

Based on Logo.

Produces Java animation.



Questions to Jim?

If all were answered, time to start the adventure...

Please introduce yourself to each other and tell them and us why you decided to take this class.

