

The background of the slide is a soft-focus photograph of a garden. In the foreground, a black and white butterfly with white spots is perched on a green stem. To its right, a small white flower with a yellow center is in focus. The background is filled with out-of-focus purple and pink flowers, creating a bokeh effect. A dark, semi-transparent rectangular box is centered over the image, containing the title and authors' names.

Beginners Programming for Biology

Yaouen Fily & Andia Chaves Fonnegra



Introductions

Andia Chaves Fonnegra

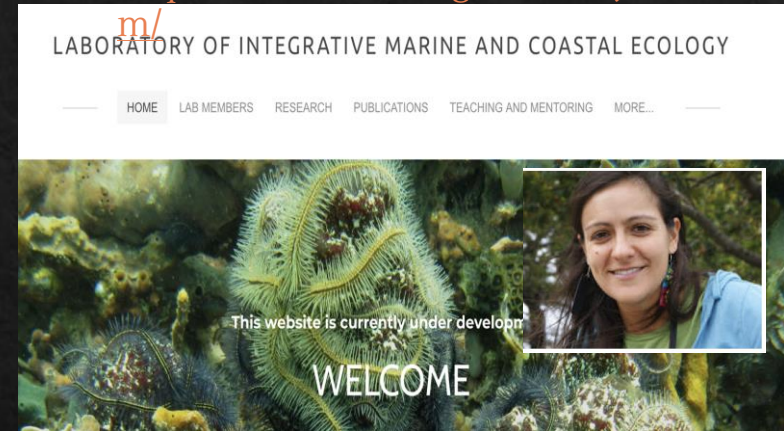
Assistant Professor of Biology

Marine Ecology

Wilkes Honors College/

Harbor Branch Oceanographic Institute

<https://andiacfonnegra.weebly.com/>

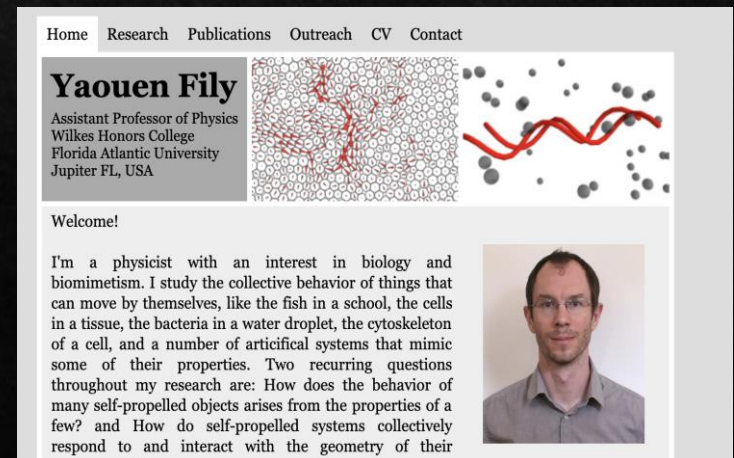


Yaouen Fily

Assistant Professor of Physics

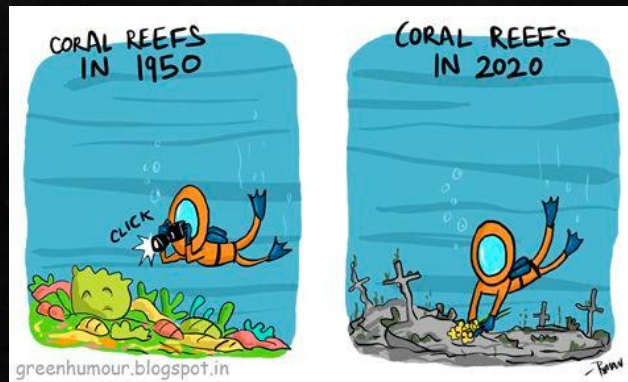
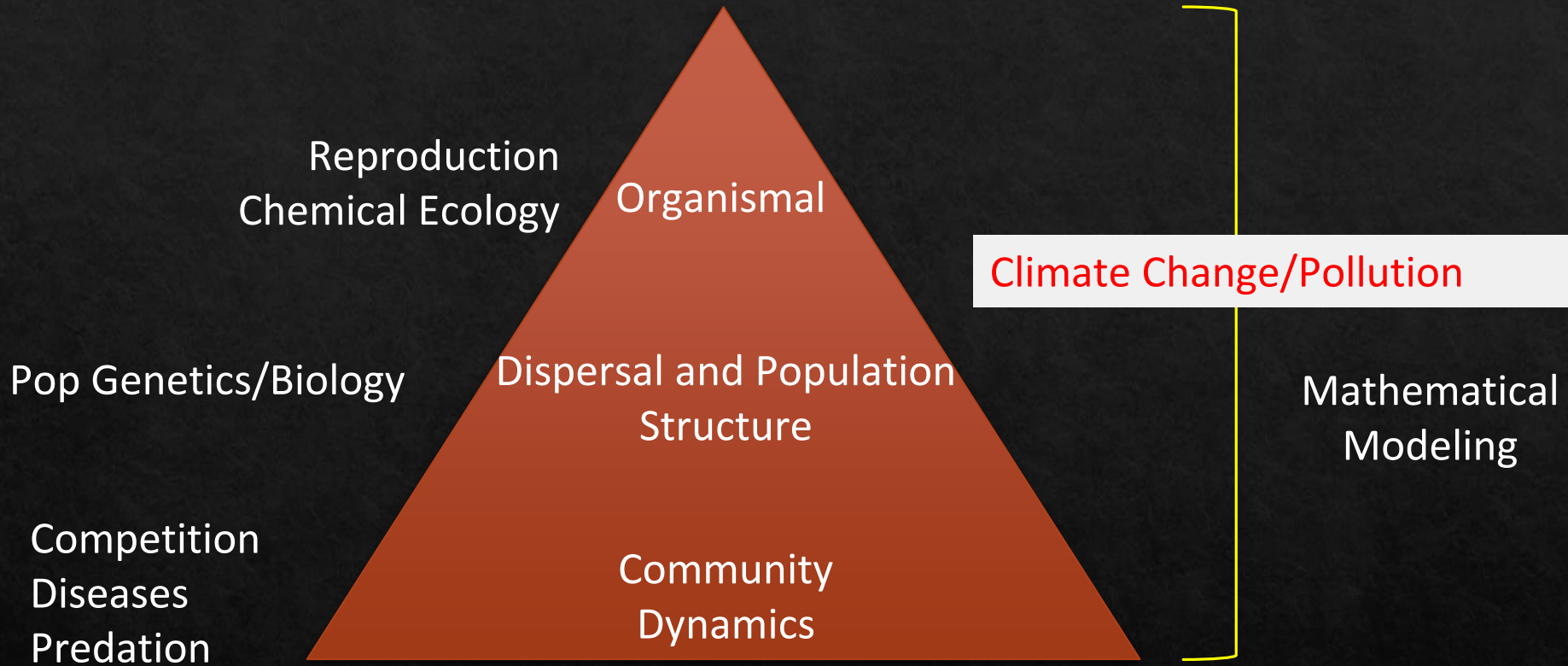
Wilkes Honors College

<http://home.fau.edu/yfily/web/>



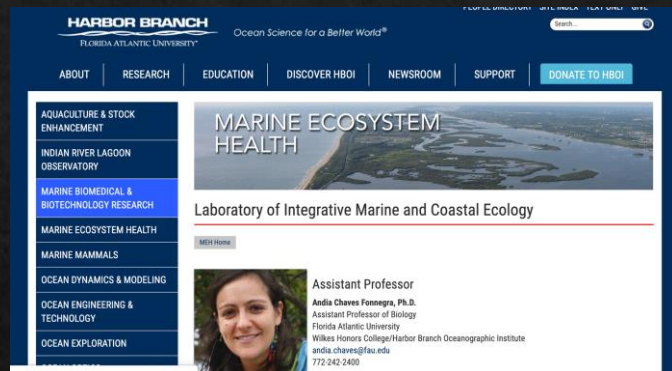
CHAVES FONNEGRA'S LAB RESEARCH INTERESTS

LABORATORY OF INTEGRATIVE MARINE AND COASTAL ECOLOGY



LABORATORY OF INTEGRATIVE MARINE AND COASTAL ECOLOGY

Harbor Branch Lab 1 – Office 137



STUDENTS

Juliet Ruggiero



Master Student
Fall 2019- Current

Holly Trew



Visiting PhD Student
Summer/Fall 2019

Gabrielle Byrd



Undergraduate Student
Summer 2019- Current

Nick Scott



HBOI Summer Intern
2019

Kyle Barnes



Summer Volunteer
2019

Mateo Encinosa



Undergraduate Student
Fall 2018- Spring 2019

CHAVES FONNEGRA'S LAB RESEARCH INTERESTS

LABORATORY OF INTEGRATIVE MARINE AND COASTAL ECOLOGY

Current Research Projects

Assessing population structure and connectivity of sponges in Florida, the Caribbean Sea and Gulf of Mexico. In Collaboration with Iris Segura- Smithsonian

Evaluating the impacts of Hurricane Irma and Maria on coral reef communities. In Collaboration with University of Mississippi, University of the Virgin Islands and University of Alabama.

Developing haplosclerid sponges as a model for the study of animal mitochondrial tRNA import. In Collaboration with Dr. Dennis V. Lavrov at Iowa State University

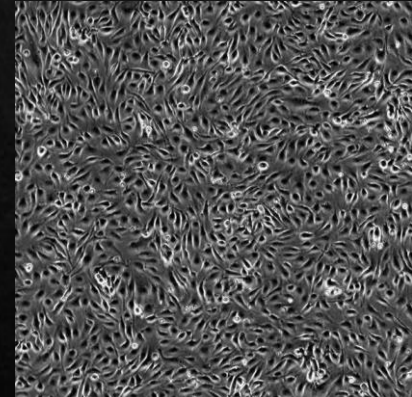
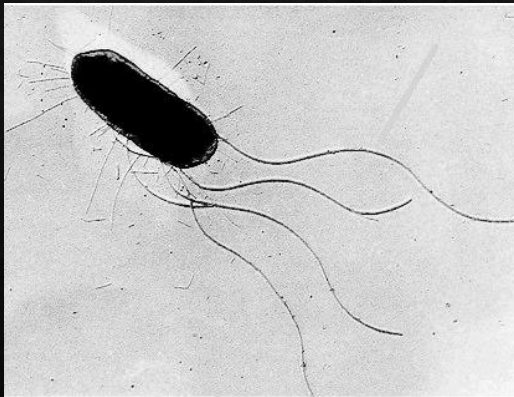
Teaching

BSC4930 Research Methods and Data Analysis

Semester by the Sea - Molecular Ecology

Collective motion of self-propelled objects

- Bacteria, birds, fish, epithelial cells, etc.
- How do they coordinate their motion? How do they respond to obstacles? When/How do they get stuck?
- What kind of fluid is a bird flock? What kind of gel is a cell tissue?



Collaborations with FAU Biologists:

- Social behavior in *Astyanax* fish (with Erik Duboue, Alex Keene, Johanna Kowalko).
- Neuronal response to stress in Zebra fish (with Erik Duboue).
- Energy production in synaptic terminals (with Greg MacLeod).

Physics students/postdocs involved:

- Adam Patch (postdoc): *Astyanax*.
- Sergio Sempertegui (grad student): Energy in synaptic terminals.



Erik
Duboue



Alex
Keene



Johanna
Kowalko



Greg
MacLeod



Adam Patch
(physics postdoc)

Stimulate computer science/biology interface.

- Realize computer science can help.
- Use computational tools in research projects, internships, honors theses.

Follow-up class:

Introduction to Computational Science.



Syllabus

Course Objectives/Overview

Today:

- Set up programming environment.
- Start/submit a Jupyter Notebook.
- Some basic programming concepts.

Weeks 2-6:

- Learn basics of programming in python.
- Write an RNA translator.

Weeks 7-14:

- Mini-projects.
- Solve some biological problems with python.
- Get a sense of what computational approaches bring to biology.

Course Format

Typical session:

- Download week's material on canvas.
- Open week's Jupyter Notebook.
- Review solution of previous week's assignment.
- Introduce new concepts/tools. Apply them to a task.
- Start working on assignment.

At home:

- Finish assignment.
- Submit to canvas by Wednesday 5pm.

Grading

Course grade = Average of weekly assignment grades.

Weekly grade criteria:

- Is the program understandable? Explain your approach. Describe each step. Describe the outcome. [5pts]
- Does the program run? Is the result correct? [5pts]

Help:

- Unlimited help with tasks and assignments.
- Therefore: no excuse for the program not to work.

Policy on late work

Assignments are given in class on Friday.

Due by Wednesday 5pm.

Graded on 10pt scale.

Late submission penalty:

- Wednesday after 5pm: -1pt
- Thursday: -2pts
- Friday before solution posted: -3pts
- After solution posted: zero grade

Note on Plagiarism

One learns to code by looking at other people's code. That's normal and expected.

BUT

No copy-pasting. Once you understand what the other person's code does, stop looking at it and write your own code.

Comments are part of how we can tell you know what you understand what you wrote (vs copying something you don't understand).

We may ask you to explain your code verbally to make sure you understand it.

Attendance

We don't usually take attendance.

BUT

You still need to submit the assignment by Wednesday 5pm.

The tasks and assignments are difficult to do on your own. The idea is we hold your hand through during class time. Missing class will have a major impact on that week's grade.

If you do miss a class, come to office hours to catch up – at the very least 1h30 of it.

University Services

- If you have a disability that impedes your learning, talk to SAS (Student Accessibility Services) in SR 111. They can provide, e.g., special furniture, assistance in taking notes, exam in individual booths and/or with extra time.
- If your psychological/emotional well-being impedes your learning, consider talking to CAPS (Counseling and Psychological Services) also in SR 111. It doesn't have to be a diagnosed mental condition. Stress overload is a good enough reason to get in touch with them.



What's programming?

What is programming?

Programming is instructing the computer to perform tasks for you.

The computer is incredibly fast. It can do things that would take you so long they would be unrealistic. It's changed science in drastic ways.

Example: Read through millions of DNA bases to identify specific patterns.

What it's like to program

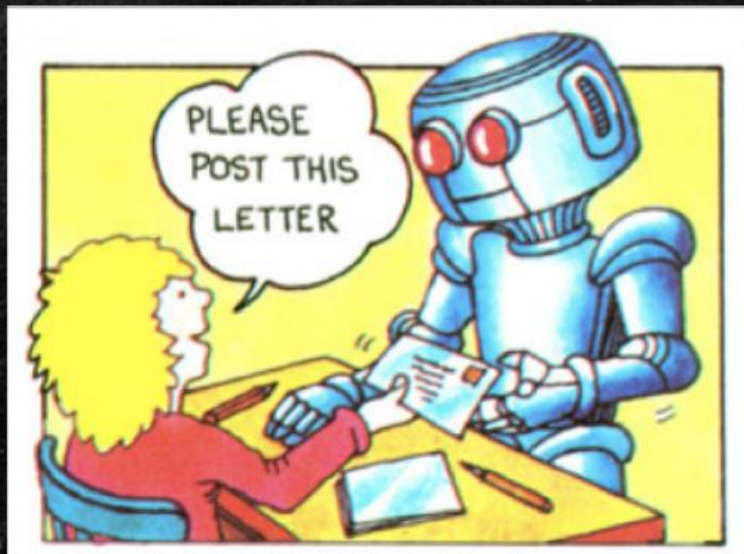
The computer is incredibly fast, but it's incredibly dumb. It has no common sense, no initiative. You need to tell it *exactly* what to do. The slightest ambiguity will make it stop.

You will hardly ever write a program that works the first time. You'll have to try to understand why it failed, fix it, then run it again, over and over again until it works.

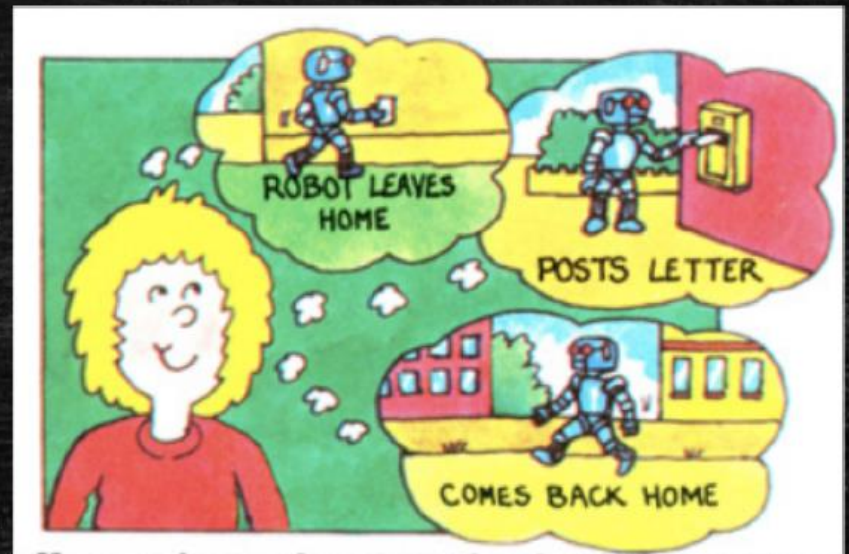
This is normal. This is what programming is like. It's frustrating, but it's worth it. We're here to help. Don't stay stuck. Ask for help!

What it's like to program

1. What you want to do



2. What you think it will do



What it's like to program

3. What actually happens...



Ask for help

You will get stuck. Your program will complain about something that makes no sense. Ask for help!

The sooner the better. Don't wait until the last minute.

We'll provide unlimited help with assignments. The only way you can get a bad grade is if you don't ask for enough help, or if you ask for it too late.

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Office hours: F 2-4



Setting up the tools.

Install Python

Windows



Jupyter Notebooks



Mac



Terminal

MacOS



Install Python

If you have your laptop, install on your laptop.

Download Windows or Mac installation tutorial on canvas (“week 1” module).

Follow tutorial’s instructions.

Call for help if something doesn’t make sense.

Opening/Submitting a Jupyter Notebook

On canvas, go to module “week 1” and download “Intro to Python.ipynb”. On Windows, save it in the WinPython folder, in the “notebooks” subfolder. On Mac, save it in a new folder you’ll create for the class in your home folder. Either way, when you start the Jupyter notebook your ipynb file should (or the folder you just created on Mac) should be visible.

Do the same with every other ipynb file on canvas.

To submit an assignment:

- Complete the assignment in the Jupyter notebook. Save it.
- Go to canvas. Click on the assignment, then upload the ipynb file.