Why?

Why are you learning this?

"I'm [studying to be] a scientist, not a programmer.
Why do I need to know how to program?"

To do good science ...

- Know your field, and your data
- Be creative, with *interesting* ideas
- Manage a research group
- Communicate your results
- Find funding
- Understand politics
- Do public speaking
- Build experiments
- Know others that can help with the above

Scientists are generalists

Don’t need to know everything about everything.

Do need to know a bit about most things.

And a lot about a few things.

“Know your data”

Bioinformatics works with large data sets.
How do you learn about 100 GB of sequence data?

Must use computers to help out.

Applications

"Restaurant meals"

- web-based BLAST, FASTA, HMMER
- PubMed, Entrez, Google
- Ensembl, WormBase

Components

"Canned meals"

- command-line BLAST, FASTA, HMMER
- unix utilities, from grep to Emboss
- web-services like EUtilities
- Excel

Toolkits

"Ingredients"

- programming languages - Perl, Python, C, C++, Java, Visual Basic, PHP
- software libraries - BioPerl, Biopython, and BioJava
- databases - MySQL, Postgres, Oracle

These Levels Mix

Add spices to a restaurant meal
Combine fresh and canned ingredients

- Write a program to do the same Entrez search every week and list the new hits.
- Do a BLAST search against sequences which have your new "QUIBBET" motif
- Merge results from different searches
- Import data into Excel for plotting

“Build Experiments”

Bioinformatics is an experimental science, where the experiments are done on computers.

In a wet lab, you can buy a machine for some experiments (like sequencing)

Or you can use several machines (stirrer, centrifuge, glassware) and piece them together.

Or make your own hardware.

New hardware

New hardware might be some tape and glue.

Or you might have a lab technician.

Or a department technician.

Or hire outside help (like me)