Introduction

David Koes

8/20/20
Zoom Etiquette

• Video on is preferred (but not required)
• Stay on Mute
• Use Chat to ask/respond to questions
  • "Raise Hand" if I don't notice chat or want to share screen/speak on Zoom
• Let me know if something isn't working
“Bioinformatics”

Definition of BIOINFORMATICS

the collection, classification, storage, and analysis of biochemical and biological information using computers especially as applied to molecular genetics and genomics

— bio-informatic adjective
“Bioinformatics”

Bioinformatics, Computational, and Systems Biology

- Bioimaging
- Molecular Dynamics
- Systems Modeling
- Sequence Analysis
- Drug Discovery
- Cheminformatics
- Proteomics
- Genomics
- Biomedical Informatics
- Data Analysis
- Protein Dynamics
- Protein Structure

Introduction
“Programming”

1. the planning, scheduling, or performing of a program
2. a: the process of instructing or learning by means of an instructional program
   b: the process of preparing an instructional program
“Programming”

Computer programming

From Wikipedia, the free encyclopedia

Computer programming (often shortened to programming) is the comprehensive process that leads from an original formulation of a computing problem to executable programs. It involves activities such as analysis, understanding, and generically solving such problems resulting in an algorithm, verification of requirements of the algorithm including its correctness and its resource consumption, implementation (or coding) of the algorithm in a target programming language, testing, debugging, and maintaining the source code, implementation of the build system and management of derived artefacts such as machine code of computer programs. The algorithm is often only represented in human-parseable form and reasoned about using logic. Source code is written in one or more programming languages (such as C++, C#, Java, Python, Smalltalk, etc.). The purpose of programming is to find a sequence of instructions that will automate performing a specific task or solve a given problem. The process of programming thus often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.
“Programming”

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There is an on-going debate on the extent to which the writing of programs is an art form, a craft, or an engineering discipline.
“Python”
“Python”
“Python”
Python

Designed to be easy to learn
Full featured, powerful language
Free - Costs nothing and open-source
Ideal for *scripting*
Popular
http://pypl.github.io/PYPL.html


<table>
<thead>
<tr>
<th>Language Rank</th>
<th>Types</th>
<th>Spectrum Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Python</td>
<td>🌐💻📱</td>
<td>100.0</td>
</tr>
<tr>
<td>2. C++</td>
<td>🌐💻📱</td>
<td>98.4</td>
</tr>
<tr>
<td>3. C</td>
<td>🌐💻📱</td>
<td>98.2</td>
</tr>
<tr>
<td>4. Java</td>
<td>🌐💻📱</td>
<td>97.5</td>
</tr>
<tr>
<td>5. C#</td>
<td>🌐💻📱</td>
<td>99.8</td>
</tr>
<tr>
<td>6. PHP</td>
<td>🌐💻📱</td>
<td>85.4</td>
</tr>
<tr>
<td>7. R</td>
<td>🌐💻📱</td>
<td>83.3</td>
</tr>
<tr>
<td>8. JavaScript</td>
<td>🌐💻📱</td>
<td>82.8</td>
</tr>
<tr>
<td>9. Go</td>
<td>🌐💻📱</td>
<td>86.7</td>
</tr>
<tr>
<td>10. Assembly</td>
<td>🌐💻📱</td>
<td>74.5</td>
</tr>
</tbody>
</table>
Introduction to Bioinformatics
Programming in Python

**Bio-Informatics Software**
- Java (892)
- Python (330)
- Perl (315)
- C++ (300)

**Molecular Science Software**
- Java (109)
- Python (75)
- C++ (69)
- C (61)

**Chemistry Software**
- Java (155)
- C++ (102)
- Python (100)
- C (57)

**Physics Software**
- C++ (311)
- Python (174)
- C (173)
Course Goals

“Analyze the data”
Course Goals

“Analyze the data”

“Analyze the data”
Course Goals

“Analyze the data”

“Do it again”

“Analyze the data”

“Do it again”
Course Goals

“Analyze the data”

“Do it again”

“Analyze the data”

“Do it again”
Course Goals

Gain experience programming
Learn Python
Survey computational methods

*Improve skills to be a more productive and successful researcher*
Coarse Goal 2020

Don't get sick!

https://www.coronavirus.pitt.edu/
About Us

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Hannah Schriever
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Office Hour: Monday 10am
About You

- 52.0% Public Sharing
- 32.0% Pitt Sharing
- 16.0% Class Sharing
Programming Experience

Lines of Code Any Language
- 100 - 1,000: 40.0%
- 1,000 - 10,000: 24.0%
- More than 10,000: 16.0%
- Less than 100: 20.0%
- 100 - 1,000: 48.0%

Lines of Code Python
- Less than 100: 48.0%
- 1,000 - 10,000: 4.0%

In-Person vs Remote

![Graph showing comparison between In-Person and Remote Learning Enthusiasm](image)

- In-Person Enthusiasm
- Remote Learning Enthusiasm

Enthusiasm Scale: 1 to 5

Introduction
Logistics

12 Programming Assignments
Due midnight on Tuesday
Autograded - submit until it works
1 day late - 90% credit
2 days late - 50% credit
>3 days late - 0% credit
Late penalty only applied to additional points
Each assignment worth ~7%
Final Project (create an assignment)

Final Grades
A: >93%
B: >85%
Logistics

Communication over Slack

http://mscbio2025.slack.com
Academic Honesty

Do your own work

Do not share or look at other students’ code

Do discuss concepts and problem solving strategies
Website

http://mscbio2025.net

Commandline Basics
Laptop setup
Change Account Password on python.mscbio2025.net