

Welcome to COMP 364
Computer Tools for Life Sciences!
Introduction

Christopher Cameron and Carlos Oliver

Key Course Information

Description: Introduction to computer programming in a high level language: variables, expressions, types, functions, conditionals, loops, objects and classes. Introduction to algorithms, data structures (lists, strings), modular software design, libraries, file input/output, debugging. Emphasis on applications in the life sciences.

List of life science topics used as examples:

- ▶ Central dogma of molecular biology, RNA and/or protein structure prediction, genome sequencing and analysis, biological networks, evolution, etc.
- ▶ Suggestions/requests?

Key Course Information

Objectives: By the end of this course, students will be able to:

1. Design and describe precise, unambiguous instructions that a computer can use to solve a problem/perform task(s)
2. Translate these instructions into a language that a computer can understand (Python)
3. Write Python scripts that solve complex problems by decomposing them into simpler subproblems
4. Apply programming-style and structure conventions to make your programs easy to understand, debug and modify
5. Learn independently about new programming-language features/libraries by reading documentation and experimenting

Key Course Information

Instructors:

- ▶ Christopher J.F. Cameron
(christopher.cameron@mail.mcgil.ca)
- ▶ Carlos Oliver
(carlos.gonzalezoliver@mail.mcgill.ca)

Schedule: MWF 3:35-4:25 PM in EDUC 216

Web page: http://cs.mcgill.ca/~cgonza11/COMP_364/

Teaching assistant:

- ▶ Roman Sarrazin Gendron
(roman.sarrazingendron@mail.mcgill.ca)

Office hours in Trottier 3104:

- ▶ (Chris) Mondays 2:00 - 3:30 pm
- ▶ (Carlos) Wednesdays 1:00 - 2:30 pm
- ▶ (Roman) Thursdays 11:30 am - 1:00 pm

CSUS Helpdesk

HOURS: 12pm - 5pm (mon-fri)
LOCATION: Trottier 3090

WHO ARE WE? WHAT DO WE DO?

- U2 and U3 students who have taken this course and want to help you!
 - We are a **FREE** drop-in tutoring service, perfect for study help, and guidance on assignments.
 - We provide review sessions for midterms and finals for intro courses!
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Key Course Information

Suggested textbook: How to Think Like a Computer Scientist: Interactive Edition (Python)

- ▶ <http://interactivepython.org/courselib/static/thinkcspy/index.html>

Schedule of topics covered + All lecture notes:

- ▶ http://cs.mcgill.ca/~cgonza11/COMP_364/
- ▶ Lectures will be recorded and made available on the course website/MyCourses

Prerequisites: BIOL 112 and a CEGEP level mathematics course

Restrictions: Only one of COMP 204, COMP 202 and COMP 208 can be taken for credit. COMP 204 cannot be taken for credit with or after COMP 250, COMP 206, or COMP 364.

- ▶ COMP 204 will replace COMP 364 starting Fall'18

Recommended Software

Python

- ▶ Created by Guido Van Rossum (early 90s)
 - ▶ Named after 'Mounty Python's Flying Circus'
- ▶ Version 3.6 will be used in this course
- ▶ We suggest installing Anaconda (Python package manager):
<https://docs.continuum.io/anaconda/install/>
- ▶ Carlos will cover more next week :)



Course evaluation

Assignments: 35% (5 assignments worth 7% each)

- ▶ Python programming
- ▶ Each aims to address a specific biological question
- ▶ First assignment due September 29th, 2017 at 11:59:59 pm

Quizzes: 5% (5 quizzes worth 1% each)

- ▶ Multiple choice questions via MyCourses

Midterm exam: 20%

- ▶ Mixture of multiple choice and short/long answer written questions (mini final exam)
- ▶ Monday, October 23, 2017 7:05-9:05 PM in MAASS 10

Final exam: 40%

- ▶ 3-hour final exam, time and place TBD

Discussion Boards

- ▶ DO NOT post solutions or code
- ▶ DO provide useful feedback/discussion for your classmates
- ▶ A 1% bonus to the final grade of the most active student on the MyCourses discussion board
 - ▶ Posts must contribute useful feedback to the ongoing discussion
 - ▶ Final grade cannot exceed 100%

Homework

Policy on late homework: Unless a medical justification is given, late assignments will be penalized by 20% per day: 0-24h late: 20%, 24h-48h late: 40%...

For some assignments, no late turn in will be accepted.

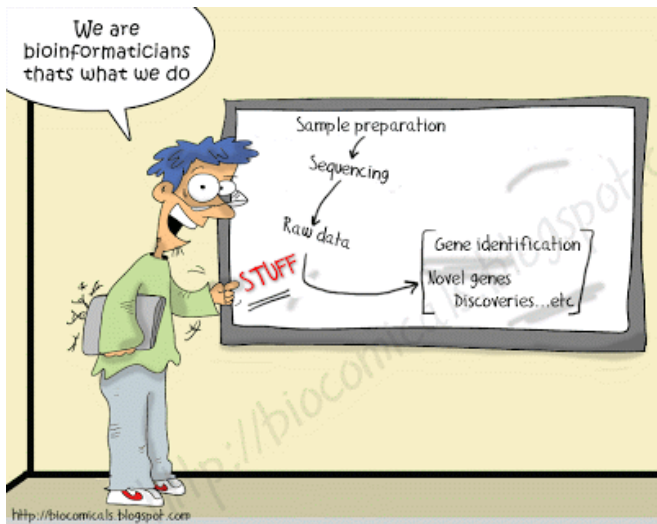
Policy on homework collaboration: It is OK to discuss homework questions with others students BUT everything you take out of a discussion must be IN YOUR HEAD (nothing written)! You have to write your solutions by yourself.
Anything else is cheating!

Integrity and French

Academic Integrity statement: McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).

Right to submit in English or French written work that is to be graded: In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

My work as a researcher



Wet lab vs. bioinformatics



Interesting applications

Phylo: solve a puzzle and help genetic disease research

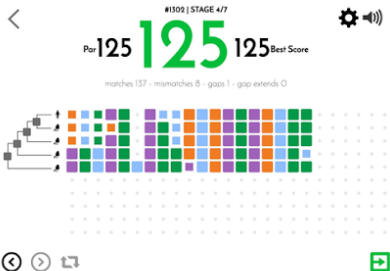
Web page: <http://phylo.cs.mcgill.ca/>



PHYLO
· SOLVE A PUZZLE AND HELP GENETIC DISEASE RESEARCH ·

- Heart and muscle diseases
- Cancers
- Metabolic diseases
- Digestive and respiratory system diseases
- Blood and immune system diseases
- Brain, nervous and sensory system diseases
- Infectious diseases
- Other diseases

Navigation icons: user, settings, trophy, bar chart, question mark, plus, Facebook, Twitter



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Par 125 **125** 125 Best Score

matches 137 - mismatches 8 - gaps 1 - gap extends 0

Phylogenetic tree and colored grid

Navigation icons: back, forward, refresh, home

Interesting applications

EteRNA: Solve puzzles. Invent medicine

Web page: <http://www.eternagame.org/web/>

