



# **BINF\*6410 Bioinformatics Programming**

Fall 2023

Section(s): C01

College of Biological Science

Credit Weight: 0.50

Version 1.00 - September 05, 2023

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## **1 Course Details**

### **1.1 Calendar Description**

This course introduces students to computer programming in languages relevant for contemporary bioinformatics. Students apply these programming skills to perform bioinformatics data analyses.

### **1.2 Course Description**

This course will introduce the Unix operating system and the Python programming language with a focus on applications in bioinformatics.

### **1.3 Timetable**

10:00-11:20. Tuesday, Thursday. SSC 1306.

### **1.4 Final Exam**

None.

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## **2 Instructional Support**

Please contact the instructor and TA via email. We will try to answer emails in a timely fashion. You can expect a response within 24 hours. Emails on Friday or the weekend may be answered the following Monday.

You can also post questions to classmates on Courselink Discussions.

### **2.1 Instructional Support Team**

**Instructor:** Lewis Lukens  
**Email:** llukens@uoguelph.ca

## 2.2 Teaching Assistants

**Teaching Assistant (GTA):** Matthew Orton  
**Email:** morton01@uoguelph.ca

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# 3 Learning Resources

## 3.1 Texts and information

The internet has problem solving tips and training modules that can quickly provide solutions.

The book Unix and Perl to the Rescue!: A Field Guide for the Life Sciences (Bradnam, D.K., and Korf, I. (2012). New York: Cambridge University Press) summarizes most of the UNIX commands we will review.

Similarly, Python for Biologists (Martin Jones (2013)) and Advanced Python for Biologists (Martin Jones (2013)) describe most of the Python commands.

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# 4 Learning Outcomes

## 4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Utilize the Unix environment to manipulate large-scale data
  2. Create Python scripts to process data.
  3. Analyze large data sets programmatically.
  4. Marshal disparate concepts to solve novel problems. We stress the development of independent programming skills. The programming motto, "There is more than one way to do it," applies!
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## 5 Teaching and Learning Activities

### 5.1 Lecture

**Topics:**

The course will consist of one python and one unix module. In each module, we will stress hands-on learning with biological data.

1. Essential Unix:

We will cover topics including an introduction to the Unix terminal, the filesystem, the Unix shell, environment variables, command line options, man pages, file and directory manipulation, text-viewing, aliases, text editors, automating Unix commands, file permissions, and modifying the path. We will also cover process control, grep, redirecting input and output, pipelines, and text manipulation.

2. Essential Python:

We will cover topics including variables, math functions, conditionals, regular expressions and pattern matching, data structures, loops, file management, and modules.

## 6 Assessments

### 6.1 Marking Schemes & Distributions

Description	Date	Points
Quizzes	Weekly. First due date is Monday, Sept. 18 <sup>th</sup> . Last due date is Monday, Nov. 27 <sup>th</sup> . No quiz Oct 9 <sup>th</sup> (Thanksgiving).	30 (3 each)

Assignment I	Thursday, Oct 5 <sup>th</sup> .	22
Assignment II	Tuesday, Nov 14 <sup>th</sup> .	24
Assignment III	Monday, Dec 11 <sup>th</sup> .	24

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## 7 Course Statements

### 7.1 Grading Policies

All assignments are due on their due date unless we have made prior arrangements. Weekly quizzes cannot be rescheduled. For coding and written assignments, I will deduct 10% for every day or partial day after the deadline.

### 7.2 Dropbox Tool

Assignments should be submitted electronically via the online Dropbox tool. When submitting your assignments using the Dropbox tool, do not leave the page until your assignment has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission.

Be sure to keep a back-up copy of all of your assignments in the event that they are lost in transition. In order to avoid any last-minute computer problems, your instructor strongly recommends you save your assignments to a cloud-based file storage (e.g., OneDrive), or send to your email account, so that should something happen to your computer, the assignment could still be submitted on time or re-submitted.

It is your responsibility to submit your assignments on time as specified on the Schedule. If, for some reason, you have a technical difficulty when submitting your assignment electronically, please contact your instructor or CourseLink Support.

## 8 College of Biological Science Statements

### 8.1 Wellness

If you are struggling with personal or health issues:

- Counselling Services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
- Student Health Services is located on campus and is available to provide medical attention.
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations.

<http://www.selfregulationskills.ca/>

## 8.2 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar.

(<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

## 8.3 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

# 9 University Statements

## 9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

## 9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

### 9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

### 9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### 9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website  
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

## 9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

## 9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## 9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

## 9.9 Illness

Medical notes will not normally be required for singular instances of academic consideration,

although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

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