BINF*6410 Bioinformatics Programming

Fall 2019
Section(s): C01

College of Biological Science
Credit Weight: 0.50
Version 1.00 - August 26, 2019

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1 Course Details

1.1 Calendar Description

This course will introduce bioinformatics students to programming languages. Languages such as C and Perl will be introduced with a focus on bioinformatics applications. The topics covered will serve to aid students when existing software does not satisfy their needs.

Restrictions: Restricted to students in Bioinformatics programs. Students in other programs may consult with course instructor.

1.2 Course Description

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

1.3 Timetable

10:00-11:30. Tuesday, Thursday, SSC 1306.

1.4 Final Exam

None.

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2 Instructional Support

2.1 Teaching Assistants

Teaching Assistant: Josip Rudar
Email: rudarj@uoguelph.ca

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3 Learning Resources

3.1 Texts

Recommended texts include 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); Advanced Bash-Scripting Guide (Mendel Cooper (2014), and Python for Biologists (Martin Jones (2013). Other texts will be provided in Courselink.

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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 biological data.
   - Create Python scripts to process data.
   - Analyze large data sets programmatically.
   - Marshal disparate concepts to solve novel problems.

We stress, "There is more than one way to do it," and students will develop independent programming skills.

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5 Teaching and Learning Activities

5.1 Lecture

Topics:

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

1. Unix: An introduction to the Unix operating system.

Essential Unix. We will cover a range of 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. All work can be performed in the HPC environment of SHARCNET.

2. Python: An introduction to computer programming, using Python as a framework.

Essential Python and BioPython. We will cover a range of topics including variables; math functions; conditionals; regular expressions and pattern matching; data structures; loops; file management; modules.

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6 Assessments

6.1 Marking Schemes & Distributions

Description	**Date**	**Points**
Quizzes	Weekly. First due date Sunday, Sept. 15th. Ending Sunday, Nov 24th. No quiz Oct 13th (Thanksgiving).	30 (3 each)
Assignment I	Thursday, Oct 10th.	20

Assignment II	Tuesday, Nov 5th.	20
Assignment III	Friday, Dec 6th.	30

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7 College of Biological Science Statements

7.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. B.Sc. Academic Advising or Program Counsellors

7.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: Chemistry & Physics Help and Math & Stats Help

7.3 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 University Statements

8.1 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.

8.2 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

8.3 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

8.4 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.

8.5 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 book their exams at least 7 days in advance and not later than the 40th Class Day.

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

8.6 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

8.7 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.

8.8 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
