Introduction to Bioinformatic Computation

The University of Toledo
BRIM Program in Bioinformatics & Proteomics/Genomics BIPG6100/8100 Intro to Bioinformatic Computation, Section 001, CRN #15301

Term: Spring
Class Location: 127HEB
Class Day/Time: Mon/Wed, 3:00-6:00pm

Instructor:
Email:
Office Hours:
or via Skype (Afedorov_lab), 8-9pm, Mon, 8-9pm **Office Location**: 308 BHS Building

Office Phone: 419-383-5270

COURSE/CATALOG DESCRIPTION

Alexei Fedorov, PhD Alexei.Fedorov@utoledo.edu Mon/Wed, 9-10am, 308 BHS Bldg

Lab Location: **Lab Day/Time**: **Credit Hours**:

127 HEB
Mon/Wed, 3:00-6:00pm 3cr hr

Students will learn the basics of working in the Linux environment and writing Perl programs relevant to bioinformatics. The strengths and limitations of bioinformatic analysis on desktop computers will also be discussed, along with the advantages and complications of using supercomputers. The course includes multiple computer laboratory sessions.

COURSE OVERVIEW

Several programming languages are used in bioinformatics, but PERL still plays a central role due to its relative flexibility and ease of use. Students will learn the basics of working in the Linux environment and writing Perl programs relevant to bioinformatics. The strengths and limitations of bioinformatic analysis on desktop computers will also be discussed, along with the advantages and complications of using supercomputers. The course includes multiple computer laboratory sessions. The last portion of the course is devoted to a group project – in the past, some of these group projects have resulted in peer-reviewed publications with the most-active students as co- authors.

STUDENT LEARNING OUTCOMES

Successful students WILL BE ABLE TO:

- Demonstrate basic familiarity with the Linux/Unix environment
- Write basic PERL programs for extracting information from, or creating, databases
- Describe the basic tasks needed to interface with supercomputers
- Communicate competently with fellow team members in projects

TEACHING STRATEGIES

There will be five introductory lectures at the beginning of this course, followed by work in the computer laboratory. Students will design Perl programs under the guidance of the Course Director. All classes will be in the face-to-face format. At the end of the course there will be a final project and exam (or take-home exam).

PREREQUISITES AND COREQUISITES

None. However, previous completion of BIPG5100 (Fundamentals of BPG) is suggested.

REQUIRED TEXTS AND ANCILLARY MATERIALS

No textbooks are required. Students will work with the information/instructions provided online.

TECHNOLOGY REQUIREMENTS

None. Computers will be provided in the computer lab.

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA)
The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.

ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

ACADEMIC POLICIES

This course follows the main UT policies.

COURSE EXPECTATIONS

Homework time policy: There are ~16 homework assignments (one per week). Each homework assignment must be returned in seven calendar days by noon. (For example, for a Wednesday class this homework must be returned via email by the following Wednesday at 12pm).

GRADING

Grading principles:

Homework/project: 40% Labs + activities: 20% Mid-term exam 15% Final Exam 25%

COMMUNICATION GUIDELINES

Office hours will be held every Monday and Wednesday from 9:00-10:00am in Dr. Fedorov's office, room 3105F, Center for Creative Education Building (CCE), or via Skype every Monday, 8:00-9:00pm (Afedorov_lab).

STUDENT SUPPORT SERVICES

Student Support Services can help students succeed in this course by providing academic services when needed in the areas of, advising, tutoring, financial resources, self-directed learning, and by directing students to other specific resources, as needed. Students can access these services by calling Student Services at, 419-383-6286.

COURSE SCHEDULE

• The first two weeks focus on the Linux environment. Students must learn a designated list of 30 commands with their main options. After one month, there is an exam on Linux use.

• Beginning in the second week of the course, and continuing until Spring break, the focus shifts to programming in PERL:

1. 1) Variables (numeric and strings)
2. 2) Loops (while, for, redo block)
3. 3) If-else control statements
4. 4) Arrays
5. 5) Hashes
6. 6) Multiple arrays, anonymous arrays
7. 7) Array of hashes, hash of arrays
8. 8) Regular expressions
9. 9) System calls to invoke various programs inside Perl scripts
10. 10) Subroutines
11. 11) Packages and modules
12. 12) References

• In the second half of the course, students begin a real bioinformatics project, working as a single team. The goal is to attack one of the important problems/challenges in genomics, and collect sufficient data for a publication. The most active students will be among the co-authors.

Timetable for Spring 2017

1) Jan 9	1h 40m (no video available)
2) Jan11	1h27m (video)
3) Jan 18	1h33m (video)
4) Jan 23	1h29m (video)
5) Jan25	49m (video) + LAB (no video available)
6) Jan30	49m (video) + LAB (no video available)
7)	