# Introduction to Bioinformatic Computation

**The University of Toledo**

**(Department of medicine, and BPG Program) \***

**(Alexei Fedorov Course Registration Number: 15301 - BIPG 6100 - 001)\***

**Instructor**: Alexei Fedorov

Alexei.fedorov@utoledo.edu

**Office Hours**: Mon/Wed 2-3pm

**Office Location**: (rm 308 , Health Science Building)

**Instructor Phone**: (419-383-5270)

**Offered**: (Spring 2022)

**Course Website**: [Blackboard Learn](https://blackboard.utdl.edu/) (if applicable)

**Class Location**: HEB 127

**Class Day/Time**: Monday & Wednesday 3:15-6:15 pm

**Lab Location**: Blackboard collaborate ultra

**Lab Day/Time**: Monday & Wednesday 3:15-6:15 pm

**Credit Hours**: (3 credit)\*

**SPECIAL COURSE EXPECTATIONS DURING COVID-19**

Maintaining a safe campus during the ongoing COVID-19 pandemic remains a top priority. UToledo continues to follow the guidance of the U.S. Centers for Disease Control and Prevention and Ohio Department of Health to keep our campus safe.   
   
**ATTENDANCE**   
The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Before coming to campus each day, students should take their temperature and complete a self-assessment for symptoms of COVID-19, such as cough, chills, fatigue or shortness of breath. Anyone with a temperature at or above 100.0 degrees Fahrenheit or who is experiencing symptoms consistent with COVID-19 should not come to campus and contact their primary care physician or the University Health Center at 419.530.5549. For more information on the symptoms of COVID-19, please go to <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>

COVID-19 testing for sick students is available on both Main Campus and Health Science Campus. Call 419.383.4545 for an appointment. Absences due to COVID-19 quarantine or isolation requirements **are** considered excused absences. Students should notify their instructors and follow the protocols summarized in this document on [Navigating COVID-Related Course Concerns](https://www.utoledo.edu/offices/provost/docs/covid-19/COVID%20student%20flow%20chart.pdf).

In the event that you have tested positive for COVID-19 or have been diagnosed as a probable case, please review the [CDC guidance](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fif-you-are-sick%2Findex.html&data=04%7C01%7CDenise.Bartell%40UToledo.Edu%7Cc3ecf55590d548a6006a08d95c3b8e19%7C1d6b1707baa94a3da8f8deabfb3d467b%7C0%7C0%7C637642233117266556%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=8jvRsGSu5bu%2BPHxfo75XszlKKqTfQig3w8ecZQR863w%3D&reserved=0) on self-isolation and symptom monitoring, and report the disclosure to the Division of Student Affairs by emailing [StudentAffairs@utoledo.edu](mailto:StudentAffairs@utoledo.edu) or by connecting with their on-call representative at 419.343.9946. Disclosure is voluntary and will only be shared on a need to know basis with staff such as in the Office of Student Advocacy and Support, The Office of Residence Life, and/or the Office of Accessibility and Disability Resources to coordinate supportive measures and meet contact tracing requirements.

**FACE COVERINGS**   
Face coverings are required while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. Students will not be permitted in class without a face covering. If you have a medical reason preventing you from wearing a face covering due to a health condition deemed high-risk by the CDC, submit an [online application](https://teton.accessiblelearning.com/Toledo/) to request an accommodation through the Office of Accessibility and Disability Resources. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. Students already affiliated with the Office of Accessibility and Disability Resources who would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs. You may connect with the office by calling 419.530.4981 or sending an email to [StudentDisability@utoledo.edu](mailto:StudentDisability@utoledo.edu).

**VACCINATION**   
Doctors and other health care professionals agree that the best way to protect ourselves and each other is to get vaccinated. Case data clearly show that vaccines remain highly effective at preventing serious illness from COVID, including the highly contagious delta variant. If you have not yet received your COVID vaccine, the University encourages you do so as soon as possible. No appointment is needed to get the shot at the UTMC Outpatient Pharmacy, University Health Clinic or Main Campus Pharmacy. Once you receive the COVID vaccination, please register on the COVID Vaccine Registry site at: <https://utvaccinereg.utoledo.edu/>.

**SPECIAL NOTES**   
It’s important to note, that based on the unpredictability of the COVID-19 virus, things can change at any time. So please be patient and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

CATALOG/COURSE DESCRIPTION

127 HEB  
Mon/Wed, 3:15-6:15pm 3cr hr.

**Delivery:** All procedures related to current COVID-19 requirements will be engaged. Currently, no conventional seminars/lectures are allowed by UT Administration. Thus, all teaching activities will be provided via online Blackboard web site and Collaborate Ultra facilities. Online lectures/seminars will be every Monday and Wednesday from 3:15 pm till 6:15 pm.

## COURSE OVERVIEW/ TEACHING METHODOLOGY

Several programming languages are used in bioinformatics, but PERL still plays an important 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. Students also will learn principles in Perl programming language. 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.

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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
* Understand programing algorithms and programing strategies
* Become familiar with computer modelling and dynamic programming
* Be capable to execute a variety of public programs on Linux platform
* Communicate competently with fellow team members in projects

PREREQUISITES AND COREQUISITES  
There is no prerequisites or co-requisites for the course.

## TEXTS AND ANCILLARY MATERIALS

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

All assignments, quizzes, video-lectures, and supporting materials will be available through UT Blackboard portal.

Free books and materials will be provided by the instructor.

TECHNOLOGY REQUIREMENTS

Blackboard-collaborate ultra, internet browser, power point. Computers will be provided in the computer lab.

ACADEMIC POLICIES  
Please read the following links for details:  
[Undergraduate Policies](http://www.utoledo.edu/policies/academic/undergraduate/): <http://www.utoledo.edu/policies/academic/undergraduate/>   
[Graduate Policies](http://www.utoledo.edu/policies/academic/graduate/): <http://www.utoledo.edu/policies/academic/graduate/>

COURSE EXPECTATIONS

* Attendance in class. The UT missed class policy: <http://www.utoledo.edu/policy/index.asp?id=87>
* Participation in class discussion
* No use of mobile device during class
* Video camera should be ON during the class
* Disruptive behavior in the lecture room will not be tolerated. Please do not bring food during the class, although a drink is acceptable.
* Please read the UT policies on student conduct and academic dishonesty located at: <http://www.utoledo.edu/policy/index.asp?id=235>.
* Students are expected to check their UT email account frequently for important course information.
* Homework time policy: There are ~15 homework assignments (one per week) and also short online quizzes after each lecture. 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).

OVERVIEW OF COURSE GRADE ASSIGNMENT

Grading principles:  
Homework/project: 40% Labs + activities: 20% Mid-term exam 10% Final Exam 30%

**UNIVERSITY POLICIES**

**Institutional Classroom Attendance Policy (Fall and Spring FULL TERM ONLY Statement)**

Please be aware that the university has implemented an attendance policy, which requires faculty to verify student participation in every class a student is registered at the start of each new semester/course. For this course, if you have not attended/participated in class (completed any course activities or assignments) within the first 14 days, I am required by federal law to report you as not attended. Unfortunately, not attending/participating in class impacts your eligibility to receive financial aid, so it is VERY important that you attend class and complete course work in these first two weeks. Please contact me as soon as possible to discuss options and/or possible accommodations if you have any difficulty completing assignments within the first two weeks.

**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.](http://www.utoledo.edu/policies/administration/diversity/pdfs/3364_50_03_Nondiscrimination_o.pdf) Students can find this policy along with other university policies listed by audience on the [University Policy webpage](http://www.utoledo.edu/policies/audience.html/#students) (http://www.utoledo.edu/policies/audience.html/#students).

**Academic Accommodations**: The University of Toledo embraces the inclusion of students with disabilities. We are committed to ensuring equal opportunity and seamless access for full participation in all courses. For students who have an Accommodations Memo from the Office of Accessibility and Disability Resources, I invite you to correspond with me as soon as possible so that we can communicate confidentially about implementing accommodations in this course.

For students who have not established accommodations with the Office of Accessibility and Disability Resources and are experiencing disability access barriers or are interested in a referral to health care resources for a potential disability, please connect with the office by calling 419.530.4981 or sending an email to [StudentDisability@utoledo.edu](mailto:StudentDisability@utoledo.edu).

**ACADEMIC AND SUPPORT SERVICES**

Please follow this link to view a comprehensive list of [Student Academic and Support Services](http://www.utoledo.edu/studentaffairs/departments.html) (http://www.utoledo.edu/studentaffairs/departments.html) available to you as a student

## SAFETY AND HEALTH SERVICES FOR UT STUDENTS

Please use the following link to view a comprehensive list [Campus Health and Safety Services](http://www.utoledo.edu/offices/provost/utc/docs/CampusHealthSafetyContacts.pdf) available to you as a student.

INCLUSIVE CLASSROOM STATEMENT

In this class, we will work together to develop a learning community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, gender identity/expression, socioeconomic background, and a myriad of other social identities and life experiences. We will encourage and appreciate expressions of different ideas, opinions, and beliefs so that conversations and interactions that could potentially be divisive turn, instead, into opportunities for intellectual and personal development.

COURSE SCHEDULE

| WEEK | DATES | TOPIC | LEARNING OUTCOME(S) | ASSIGNMENTS DUE |
| --- | --- | --- | --- | --- |
| 1 | 1-19 | Introduction to Linux | See below\* | Quiz + Homework |
| 2 | 1-24/1-26 | Introduction to Linux |  | Quiz + Homework |
| 3 | 1-31/2-22 | Introduction to Linux, Exam |  | Quiz + Homework |
| 4 | 2-7/2-9 | Variables, arrays |  | Quiz + Homework |
| 5 | 2-14/2-16 | Loops |  | Quiz + Homework |
| 6 | 2-21/2-23 | If-else control statements |  | Quiz + Homework |
| 7 | 2-28/3-2 | Associative arrays |  | Quiz + Homework |
|  |  | **SPRING BREAK** |  |  |
| 8 | 3-14/3-16 | Multiple arrays, anonymous arrays |  | Quiz + Homework |
| 9 | 3-21/3-23 | Regular expressions |  | Quiz + Homework |
| 10 | 3-28/3-30 | Reg expr, subroutines |  | Quiz + Homework |
| 11 | 4-4/4-6 | System calls to invoke various programs inside Perl scripts |  | Quiz + Homework |
| 12 | 4-11/4-13 | Packages and modules |  | Quiz + Homework |
| 13 | 4-18/4-20 | References, Dynamic programming |  | Quiz + Homework |
| 14 | 4-25/4-27 | Program Installation |  | Quiz + Homework |
| 15 | 5-2/5-4 | Final Exam |  |  |
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