Professional Bioinformatics

What course is this?

Course Catalog: Independent Study; BIOL 695. Informal title: Professional Bioinformatics

Credits: 2

Instructor: Timothy Driscoll (timothy.driscoll@mail.wvu.edu)

Prerequisites: N/A

Meeting Times: TBD

Location: Life Sciences Building 4001

What are the important dates?

21-Aug: First day of classes

27-Aug: Last day to add

09-Oct: Mid-term Grades Due

11-Oct: Fall Break (*no class*)

05-Nov: Election Day (*no class*)

22-Nov: Last Day to Drop

23-Nov: Fall Recess begins (*no class*)

01-Dec: Fall Recess ends

12-Dec: Last day of classes

How do I get in touch?

Email: timothy.driscoll@mail.wvu.edu

Social: @WVUvectors

Office (Physical): LSB 4204

Office (Virtual): https://wvu.zoom.us/my/driscollwvu?pwd=NVE4TitMQ3BCRFRMNkM0UjBMOGJsQT09

Office Hours: TBD, or by appointment

What is this course all about?

This inquiry-based graduate course is for life science students interested in a career in bioinformatics or related fields. You will be introduced to the some common software tools and concepts, as well as the application of those tools to real-world problems (in Fall 2024 we will focus on the analysis of sequence data). The underlying goal of this course is to provide a platform for you to develop marketable skills in bioinformatics. You are encouraged to "bring your own data" if applicable; if not,

you may use published data. Unlike other courses, we are less concerned with the data and more with the process. The fundamental goal of this course is to equip you with marketable skills.

Learning Objectives: What am I going to learn?

This course aims to meet several learning objectives. At the end of the semester you will be able to:

Define collaborative code development and describe the benefits and challenges.

Establish, **maintain**, and **work** within a git code repository.

Use an integrated development environment (IDE) to develop bioinformatic code.

Define large language models (LLMs) and **evaluate** in general terms their potential role in bioinformatics.

Design a solution to address a specific bioinformatic problem and **communicate** it in an effective manner, including advantages, disadvantages, and a simple cost-benefit analysis.

Use end-to-end software solutions such as BaseSpace and Galaxy.

Identify appropriate bioinformatic solutions as they apply to existing data sets, and why.

Define data exploration and **describe** how and when it is useful.

Use data visualization tools effectively to explore large, complex data sets.

Activities: What will I do?

This course is broken down into three modules. In **Module 1**, you will be introduced to common software tools and approaches used in bioinformatics. We will focus on general platforms such as git and Github, integrated development environments, benchmarking, and end-to-end solutions such as BaseSpace and Galaxy – tools you might expect to use in any career bioinformatics position – rather than domain-specific command line tools. In **Module 2**, you will choose a bioinformatics problem and generate a solution. An acceptable solution will include approach, specifications, implementation (i.e., actual code), and post analysis. In **Module 3**, you will be introduced to data exploration as a method for generating insight on large data sets. You will learn fundamental concepts in effective data visualization, and how to use a few common data exploration tools (e.g., Tableau, R). In this module you will visualize the results from your work in Module 2.

Assessment: How will my progress be evaluated?

Milestones. **Milestones** are relatively small, concrete tasks identified as important for skill progression in bioinformatics. You will be awarded 1 point when you accomplish a milestone. There is no partial credit. You may attempt a milestone as many times as you need to accomplish it, without penalty. Milestones have no set due dates; however, they are broadly hierarchical such that later milestones may rely on your successful completion of earlier ones.

Deliverables. **Deliverables** are specific products that you generate according to specifications provided in advance. For example, a compute script that performs a set of analyses on a defined data set is a deliverable. You will be responsible for 3 deliverables for this course (one after each module). Each deliverable will be assessed by how closely it aligns to the specifications using the following scale: Production Ready; Release to Beta Testing; Requires Further Development; Requires Major Revision;

Not Submitted. You may submit a deliverable as often as you want up until its associated release date with no penalty. On its associated release date, your deliverable will be frozen and you will not be able to change it.

What if I need help outside of class?

Ask your instructor or consult with your classmates and peers. You are encouraged to ask for help when you encounter confusing or challenging material, or want to discuss something in more detail. Discussing course material with your peers is acceptable and encouraged. Note that this is distinct from copying another person's work, which is definitely not acceptable under any circumstances. If you need to discuss something privately, please contact your instructor to schedule an appointment.

Can I bring my weapon to office hours?

tl;dr No you may not. Consistent with BOG Finance and Administration Rule 5.14, Deadly Weapons, Dangerous Objects, & W. Va. Campus Self-Defense Act, this statement serves as notice that **my office is a sole occupancy office, and concealed pistols and revolvers are prohibited in it**. Students visiting my office, whether scheduled or unscheduled, are required to appropriately secure any firearms in their possession before entering the office premises. For more information about Rule 5.14, please visit https://safety.wvu.edu/campus-carry.

Can you please change my grade?

Assessment results are final and will not be changed. The only exception is in the case of an error in either score calculation or submission date error. If you can show definitive evidence that one of these errors has occurred, it will be corrected. This holds true up until final grades are submitted.

Should I come to class?

If you are healthy and COVID-negative, it is a good idea for you to attend class in person. You will benefit from interactions with your peers and your instructor, and it will be good to discuss this material with other humans.

If you are sick, or if you test positive for COVID, please do not come to class. This is true for any illness, not just COVID. You will be given every opportunity to make up any missed work or assignments due to illness. There will be no penalty for missing class due to illness (COVID or otherwise) or a positive COVID test.

If you will be absent for a prolonged period of time, please make arrangements with your instructor regarding assignments and class material that you will miss.

Mental health

Mental health concerns or stressful events can adversely affect your academic performance and social relationships. WVU offers services to assist you with addressing these and other concerns that you

may be experiencing. You can learn more about the broad range of confidential mental health services available on campus at the Carruth Center for Psychological and Psychiatric Services (CCPPS) Web site: https://carruth.wvu.edu/.

If you are in need of crisis services, call the CCPPS main number 24/7: (304) 293-4431. Crisis services are also available through text: Text WVU to 741741 for support 24/7 from a trained Crisis Counselor.

Academic Integrity

tl;dr Don't cheat. You're only hurting yourself. The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, instructors will enforce rigorous standards of academic integrity in all aspects and assignments of their courses. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty, and possible sanctions, please see the West Virginia University Academic Standards Policy. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see your instructor before the assignment is due to discuss the matter.

Diversity, Equity, and Inclusion

tl;dr This is a safe space. The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you anticipate needing any type of accommodation in order to participate in this class, please advise your instructor in advance and make appropriate arrangements with the Office of Accessibility Services (304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu/.

Sale of Course Material Statement

tl;dr Don't buy or sell class material. All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other course materials provided to students for their courses are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the Student Conduct Code.

Sexual Misconduct Statement

West Virginia University does not tolerate sexual misconduct, including harassment, stalking, sexual assault, sexual exploitation, or relationship violence [BOG Rule 1.6]. It is important for you to know that there are resources available if you or someone you know needs assistance. You may speak to a member of university administration, faculty, or staff; but keep in mind that they have an obligation to report the incident to the Title IX Coordinator.

If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Carruth Center, 304-293-9355 or 304-293-4431 (24-hour hotline), and locally within the community at the Rape and Domestic Violence Information Center (RDVIC), 304- 292-5100 or 304-292-4431 (24-hour hotline). For more information, please consult WVU's Title IX Office.

Student Evaluation of Instruction Statement

Effective teaching is a primary mission of West Virginia University. Student evaluation of instruction provides the university and the instructor with feedback about your experiences in the course for review and course improvement. Your participation in the evaluation of course instruction is both strongly encouraged and highly valued. Results are strictly confidential, anonymous, and not available to the instructor until after final grades are released by Admissions and Records. Information about how you can complete this evaluation will provided by your instructor.