GMS Analysis of benchmark long read transcript sequencing data

(1 credit)

COURSE DESCRIPTION:

We will offer a journal club that focuses on student hands-on exploration of long read sequencing data for transcripts from competing technologies Oxford Nanopore and Pacific Bioscience. In the first week, a weekly meeting time will be chosen and students will be expected to read 3-5 background papers on the biochemistry behind each of the technologies and library preparation strategies. Our first meeting in week 2 will contain a brief presentation of data file formats, data files, and the benchmark dataset (https://www.gencodegenes.org/pages/LRGASP/#). Students will be provided with a HiPerGator account (the computing platform) and directions for how to access on-demand basic training. The approach to the analysis will be the subject of the first few classes and then teams will be formed to tackle several alternate approaches with the goal of comparing the impact of analytic choices on the results. Students at all skill levels willing to engage are welcome.

COURSE OBJECTIVES:

- Learn how to analyze long read transcript sequences
- Read a paper about analytical approaches in long read and understand the technology and analytical details
- Identify assumptions behind analytical approaches
- Submit jobs on the high performance computer using command line methods
- Perform Quality control analyses of omics data
- Keep a Data notebook
- Understand principles of reproducibility in bioinformatics
- Reproduce an analysis from a classmate

MEETING PERIODS: TBD

MEETING ROOMS: R2-265 HYFLEX
COURSE PREREQUISITE:
This course does not assume many specific computational skills. However, it is fast paced and relies on students to be motivated to keep up with the homework and participate actively in their own learning by completion of weekly assignments that should be assumed will take 3 to 4 hours for those already conversant with the high performance computing platform at UFL. For those not familiar with the command line additional time at the start of the semester, needs to be budgeted.

INSTRUCTOR:

Dr. Lauren McIntyre
Department of Molecular Genetics and Microbiology
College of Medicine
Cancer & Genetics Research Complex, Rm. 116
Phone: (352) 273 8024
e-mail: mcintyre@ufl.edu

OFFICE HOURS:
Directly after class

TEXTBOOKS: none required

REQUIRED MATERIALS/FEES: HPG account. If you have an account you will be added to the class, if you do not have an account you will receive a temporary account.

GRADES:
Will be an average of weekly assignments (50%) and a final project (50%). Students will work in teams and each team member will be responsible for specific tasks throughout the semester. Final project will include a full set of reproducible documentation of the analysis pipeline, and an interpretation of findings. Weekly assignments will be diverse and each will contribute to the success of the final project. For example one week it may be to generate a table of mapped reads using a particular software, another week it may be to interpret QC output.

Grading scale is

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There will be no curve. Grade points and policies are consistent with UF grading (https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx) More information on UF grading policy may be found at: http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades

**CLASS ATTENDANCE:** Class attendance is mandatory. The UF attendance policy is used https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx For any long term absence that is excused in accordance with the UF policy reasonable accommodation will be made.

**COVID-19 STUDENT BEHAVIORAL EXPECTATIONS**
https://coronavirus.ufl.edu/university-updates/august-6-campus-brief-.html

**COURSE EVALUATION** Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

**CLASS DEMEANOR** Students are expected to arrive to class on time (zoom participants please be online 5 minutes before the official class start time to ensure technology is functioning and class can start on time). Students are expected to behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones/other internet activity during class. Opinions held by other students should be respected in discussion, and conversations during the class time should be focused on class material only. Please respect all of your fellow students. Students will be from a broad range of preparation for the material, and all questions are to be respected. There is no such thing as a stupid question.

**ACADEMIC HONESTY.** As a result of completing the registration form at the University of Florida, every student has signed the following statement: “I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University”. It is especially important to not disclose information on assessments as students are performing assessments asynchronously.
**RECORDING** Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student.

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**ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [https://www.dso.ufl.edu/drc](https://www.dso.ufl.edu/drc)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.
SOFTWARE USE AND COPYRIGHT All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use and respect of copyright. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

STUDENT PRIVACY There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

UF COUNSELING SERVICES: Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance. These resources include:

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.


Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.
Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. [https://writing.ufl.edu/writing-studio/](https://writing.ufl.edu/writing-studio/).


TENTATIVE CLASS SCHEDULE

This is an approximate schedule of lecture topics. Order and content subject to revision with no advance notice.

WEEK 1:
Meet, presentation on long read technology, first assignment

WEEK 2:
HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC5848618/
HTTPS://WWW.GENCODEGENES.ORG/PAGES/LRGASP/
HTTPS://ACADEMIC.OUP.COM/GIGASCIENCE/ARTICLE/10/2/GIAB003/6137723

WEEK 3: TEAM FORMATION TOOL SELECTION

Remaining weeks will be dedicated to team analysis of benchmark data and discussion