Syllabus

Genomic Sequencing and Analysis

ISC5XXX

Instructor:

Dr. Alan Lemmon
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Dirac 150-D, BRF 213
Office hours: MW 1:15-2:30 and by appointment
Phone 850.445.4393

Prerequisites:

BSC 2010 or CGS 2060 or ISC 3313 or equivalent or instructor consent

Course Webpage

Course materials will be distributed through a blackboard site dedicated to the course. http://campus.fsu.edu

Catalog Description

This course will provide students with training in the process of analyzing high-throughput DNA sequence data. After lectures designed to bring students up to speed on the cutting edge DNA sequencing technologies, students will develop and/or apply new algorithms for efficient processing of large amounts of genome-scale data.

General Format of Course:

Monday:
- Introduction to Problem
- Discuss Possible Solutions

Wednesday:
- Describe Published Solution(s)
- Introduce Software/Scripts

Friday (Lab):
- Hands-on Experience

Pre-requisites: None.

Schedule of Topics:

Week 1-2: Sequencing Technologies
Week 3: Library Preparation

Week 4: Enrichment and Multiplexing
Week 5-6: Denovo assembly
Week 7-8: Reference assembly
Week 9: Hybrid assembly, Midterm exam
Week 10-11: Sequence Orthology
Week 11-12: Sequence Alignment
Week 13-15 Downstream Applications
Week 16 Semester Project Presentations

**Note that this is a tentative list and is subject to change

Objectives:

1) describe, compare, and contrast current methods of DNA sequencing
2) assemble genome scale DNA sequence data
3) use genome-scale DNA sequence data for downstream applications
4) describe the differences between whole genome, RNA-seq and targeted sequencing
5) Read, understand, and present a published algorithm used for DNA sequence analysis
6) describe algorithms used for DNA sequence analysis
7) develop or utilize new algorithms for DNA sequence analysis

Grades:

35% (350 pts) **Attendance and Participation**
25% (250 pts) **Midterm Exam**
15% (150 pts) **Student Algorithm Presentation**
25% (250 pts) **Semester Project**

Graduate vs. Undergraduate Section Expectations

For Algorithm presentations, graduates will be expected to present for 3 additional minutes on possible future directions related to the chosen algorithm.
For independent projects graduate students will be expected to implement a new algorithm/pipeline or extend substantially an existing algorithm/pipeline.
For project reports, graduates will be expected to include, a thorough introduction, methods, results, and a in-depth discussion.
Letter grades will be assigned (and curves will be applied) separately for graduate and undergraduate sections.

Attendance, Reading Assignments, Participation

Since this is a hands-on course with no textbook, class attendance is

critical.

Midterm Exam

A hand-written midterm exam covering the topics covered in class will be given half-way through the semester.

Student Project

Students will work in teams to develop and implement a new algorithm/pipeline or utilize in a new way a preexisting algorithm/pipeline. Students will be graded based on written and oral reports, in addition to the design and implementation of the algorithm.

Free Tutoring from FSU:
On-campus tutoring and writing assistance is available for many courses at Florida State University. For more information, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of on-campus tutoring options at http://ace.fsu.edu/tutoring or contact tutor@fsu.edu. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

Syllabus Change Policy:
Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.

University Attendance Policy:
Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy:
The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "...be honest and truthful and...[to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at http://fda.fsu.edu/Academics/Academic-Honor-Policy)

Americans with Disabilities Act:
Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the: Student Disability Resource Center 874 Traditions Way 108 Student Services Building Florida State University Tallahassee, FL 32306-4167 (850) 644-9566 (voice) (850) 644-8504 (TDD) sdrc@admin.fsu.edu
http://www.disabilitycenter.fsu.edu