GENET 5910: Workshop in Genetics

Fall 2025

Topic: **Data Analysis: Techniques and Applications**

Instructor: Dr. Josh Beck	**Email:** jrbeck@iastate.edu
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Time: M 3:20 - 4:10 pm	📍 0119 SCI 2-Science Hall Addition No. 2
Class delivery mode: In-person	**Optional course reading:** TBD

Learning outcomes: This course is designed primarily to provide graduate students with tools and techniques for genomics and data science, with an emphasis on data analysis workflows practical for omics datasets. Students will gain hands-on experience in R and Python, focusing on data retrieval from public databases, preprocessing, quality control, and statistical analysis. This course aims to introduce students to a diverse array of data analysis and tools with hands-on demonstrations using real-world applications.

Grading Policy: This class is offered on a satisfactory-fail basis only

Class Policy:

1. Students are expected to participate in the workshop sessions and presentations. Students are encouraged to ask questions to the presenters. Students are expected to participate in group discussions following sessions and contribute to the overall understanding.
   All students are expected to give a group data analysis presentation at the end of the semester.

2. Students must attend all guest speaker presentations. Students are expected to have brainstormed questions for the speaker and are encouraged to ask the speaker questions following their talk.

3. Absences: Students who miss a guest speaker, or another group's presentation for an excusable circumstance (i.e. military duty, hospitalization, funeral, conference) must contact instructors for make-up assignment within one week following the missed class; failure to do so will result in receiving an "F" for the course.

4. Regular attendance is essential and expected.
   Only 1 excused absence is allowed (except in extenuating circumstances).

Course Schedule

Date	Topics
Week 1: Aug 25	Syllabus, Course Expectations, Form groups for paper presentation Data Analysis Introduction
Week 2: Sept 1	University Holiday: Labour Day
Week 3: Sept 8	Data Wrangling, Preprocessing, and Visualization in R
Week 4: Sept 15	Data Wrangling, Preprocessing, and Visualization in Python
Week 5: Sept 22	Statistical tests, Regression, and Correlation
Week 6: Sept 29	Sequence alignment and Phylogenetic analysis Reproducible Genomic Data analysis Ethical concerns and Genomic data privacy
Week 7: Oct 6	Omics Data Analysis
Week 8: Oct 13	RNA-Seq & RNA Functional Structures Speaker: Dr. Walter Moss
Week 9: Oct 20	Polygenic score (or EBV) and GWAS
Week 10: Oct 27	Network Biology and System Genomics Speaker: Dr. Chris Tuggle
Week 11: Nov 3	Introduction to Machine Learning and Model Evaluation
Week 12: Nov 10	Machine Learning for Plant Genomics Speaker: Dr. Patrick Schnable
Week 13: Nov 17	Review and Questions
Week 14: Nov 24	Thanksgiving Break
Week 15: Dec 1	Student presentations
Week 16: Dec 8	Student presentations Feedback and Suggestions for Fall'26 Pizza Party!

Academic Honesty
This class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. http://www.dso.iastate.edu/ja/academic/misconduct.html

Disability Accommodation
Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact (instructor name) to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with (instructor name), you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu. Retroactive requests for accommodations will not be honored.

Harassment and Discrimination
Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation
If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

Contact Information
If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu