

Sample Syllabus Course Schedule

Reading corresponding to each topic may be assigned ahead of class and may come from the required text (*Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools*. 2015 Buffalo. **ISBN-13:** 978-1449367374) or from instructor-supplied reading materials.

Preparation homework will be assigned in addition to primary assignments listed below. Prep homework may not always be collected but is intended to help students prepare for class material and reduce download times in class.

Teaching Demo: Students will test and build an RNAseq pipeline that ultimately examines differential expression between fly strains that have been exposed to copper stress conditions. Students will be asked to modify and run scripts before class as preparation homework. I've provided this completed prep homework to demonstration participants as part of the RNAseq_Pipeline.zip directory.

Week	Topic	Corresponding Assignment
Week 1	Introduction to Bioinformatics	
Week 2	Biological Databases, tidy data	Tidy Data Assignment (10pts)
Week 3	Sequencing and Technologies	Sequencing Tech Assignment (40pts)
Week 4	Unix Shell Bioinformatics Skills	Unix Assignment (25pts)
Week 5	Unix Shell continued, Remote Computing, Project Management	Project Management Assignment (20pts)
Week 6	Genomics Case Study 1 (BLAST)	Case Study Report 1 (30pts)
Week 7	Data Visualization, Bioconductor and Annotation Databases	R Assignment (25pts)
Week 8	Bioinformatics Tools and Building Pipelines	Pipelines Assignment (25pts)
Week 9	Genomics Case Study 2 (WGS)	Case Study Report 2 (60pts)
Week 10	Genomics Case Study 2 (WGS), cont.	
Week 11	Genomics Case Study 3 (RNAseq)	Case Study Report 3 (60pts)
Week 12	Genomics Case Study 3 (RNAseq), cont., Parallelizing Tasks	Shell Assignment (25pts)
Week 13	Producing Markdown Reports, Data Visualization, Supporting Reproducibility	Reports Assignment (Case Study Report 3 Draft) (20/60pts)
Week 14	Genomics Case Study 4 and Report (Final Project)	Final Project Report (80pts)
Week 15	Genomics Case Study 4 and Report (Final Project)	Final Project Report (80pts)
Week 16	Advanced Topics: scRNAseq, Proteomics	Final Project Draft Due (20/80pts)
Week 17	Finals Week	Final Project Due (60/80pts)

* = previously covered content provides training in bash scripting, R scripting, pipeline building and best practices (status updates and error management), and tools used for quality control (fastp, fastQC) and trimming (fastp, trimmomatic) of raw fastq data

* = demonstration comes from the second day of Week 11 and from a 2-week case study on RNA sequencing that covers concepts underlying RNAseq, pipeline building and testing, and differential expression analysis. Students will produce a report (Case Study Report 3) describing the analysis and results.