

Spring 2021 - CM508A3: Intro to Quantitative Cell and Molecular Biology

Week		Date	Topic	Facilitator
1	M	01/18/21	MLK Day - no classes	
1	W	01/20/21	Syllabus and Software Installation	David King
2	M	01/25/21	R -Reproducible research lecture	Brooke Anderson
2	W	01/27/21	R -Reproducible research exercise	Brooke Anderson
3	M	02/01/21	Python Basics - Lecture	Kristin Scott
3	W	02/03/21	Python Basics - Exercise	Kristin Scott
4	M	02/08/21	Genomic and Bioinformatic Databases	Kailee Reed
4	W	02/10/21	Genomic and Bioinformatic Databases	Kailee Reed
5	M	02/15/21	Introduction to BASH and high-performance computing	David King
5	W	02/17/21	Introduction to BASH and high-performance computing	David King
6	M	02/22/21	Statistical Reproducibility	Ben Prytherch
6	W	02/24/21	Statistical Reproducibility	Ben Prytherch
7	M	03/01/21	Proteomics	Jessica Prenni
7	W	03/03/21	Proteomics	Jessica Prenni
8	M	03/08/21	Metabolomics	Jessica Prenni
8	W	03/10/21	Metabolomics	Jessica Prenni
9	M	03/15/21	Sequence Alignment and Phylogenetics	Alissa Williams
9	W	03/17/21	Sequence Alignment and Phylogenetics Ex.	Alissa Williams
10	M	03/22/21	Mapping and Assembly	Mark Stenglein
10	W	03/24/21	Mapping and Assembly	Mark Stenglein
11	M	03/29/21	RNA-seq lecture	Zaid Abdo
11	W	03/31/21	RNA-seq exercise	Reed Woyda
12	M	04/05/21	Genomics Data Visualization Lecture	Dan Sloan
12	W	04/07/21	Genomics Data Visualization Exercise	Dan Sloan
13	M	04/12/21	Spring Break - no classes	
13	W	04/14/21	Spring Break - no classes	
14	M	04/19/21	Microscopy and Image Analysis	Tetsuya Morisaki
14	W	04/21/21	Microscopy and Image Analysis	Dylan Parker
15	M	04/26/21	Interactome, Regulatory and Other Networks	Cris Argueso
15	W	04/28/21	Interactome, Regulatory and Other Networks	Cris Argueso
16	M	05/03/21	Unsupervised Learning in Molecular Biosciences	David King
16	W	05/05/21	Unsupervised Learning in Molecular Biosciences	David King

Descriptive syllabus with for CM508A3

Week 1: MLK day and Syllabus, Code of conduct. Software for class.

Description: Go over syllabus and code of conduct. Remaining time will review software requirements, and/or using Zoom or Teams.

Dates: 01/18/21, 01/20/21

Lecturer(s): Dr. David C. King

Week 2: Reproducible Research with R.

Description: In this module, we will provide detailed instructions on how to use RMarkdown in RStudio to create documents that combine code and text. We will show how an RMarkdown document describing a data pre-processing protocol can be used to efficiently apply the same data pre-processing steps to different sets of raw data.

Dates: 01/25/21, 01/27/21

Lecturer(s): Dr. Brooke Anderson

Week 3: Python basics

Description: Python is a versatile scripting language that has powerful practical and analysis capabilities. This module will explore syntax, libraries, and best practices for a working knowledge of the uses and applications of Python.

Dates: 02/01/21, 02/03/21

Lecturer(s): Kristin Scott

Week 4 Genomic and Bioinformatic Databases:

Description: This module will focus on where to find, how to query, and how make use of information and data from published research. Exercises will provide hands-on experience on a few common databases that will enable future researchers to make use of published data.

Dates: 02/08/21, 02/10/21

Lecturer(s): Kailee Reed

Week 5: Introduction to BASH and high-performance computing

Description: Lectures and exercises will present a working knowledge of how to operate in a linux environment using the command line. This will set the groundwork for building pipelines for analysis. We will also make use of servers with high-throughput computing resources.

Dates: 02/15/21, 02/17/21

Lecturer(s): Dr. David C. King

Week 6: Statistical Reproducibility

Description: This module explores how common statistical practices contribute to problematic trends in the reproducibility of research. The material presents a deeper understanding of the basis of hypothesis testing and statistical inference, proposing stronger practices for evaluating the confidence in research results. Exercises will explore the mechanics of statistical practices.

Dates: 02/22/21, 02/24/21

Lecturer(s): Ben Prytherch (Statistics Dept.)

Week 7 and 8: Proteomics and Metabolomics

Description: Lectures will provide an introduction to the analytical methods utilized in proteomics and metabolomics applications. Students will be exposed to broad topics including instrumentation, experimental design, data structure, and limitations. In the hands-on data exercise students will work with “real” metabolomics data and gain exposure in steps associated with data analysis.

Dates: 03/01/21, 03/03/21,

03/08/21, 03/10/21

Lecturer(s): Dr. Jessica Prenni

Week 9: Sequence Alignments and Phylogenetics

Description: This module will explore the background of sequence homology and evolutionary conservation. Exercises will provide practical experience with alignment methods used to identify and characterize new sequences.

Dates: 03/15/21, 03/17/21

Lecturer(s): Alissa Williams

Week 10: Mapping and Assembly

Description: This module will focus on genome sequence assembly and the exercise will go through assembling and aligning public data.

Dates: 03/22/21, 03/24/21

Lecturer(s): Dr. Mark Stenglein

Week 11: In depth: RNA-seq analysis

Description: This module will explore background and analysis of RNA-seq data. The exercises will conduct step-by-step analysis of real-life datasets.

Dates: 03/29/21, 03/31/21

Lecturer(s): Dr. Zaid Abdo & Reed Wodya

Week 12: Genomics Data Visualization

Description: This module will explore clear and accurate representation of your data, with attention to clean, professional, and aesthetically pleasing appearance. Exercises will concentrate on producing efficient, reproducible, and automated figures using R.

Dates: 04/05/21, 04/07/21

Lecturer(s): Dr. Dan Sloan

Week 13: Spring Break. No class on 04/12/21 or 04/14/21

Week 14: Microscopy and Image Analysis

Description: This module will explore the foundation of modern microscopy. The exercises work with data in the software environment FIJI.

Dates: 04/19/21, 04/21/21

Lecturer(s): Dr. Tatsuya Morisaki and Dylan Parker

Week 15: Interactome, Regulatory and Other Networks

Description: This module explores the complex interaction between molecular components in biological systems. The exercise provides hands-on experience analyzing data describing these complex processes.

Dates: 04/26/21, 04/28/21

Lecturer(s): Dr. Cris Argueso

Week 16: Unsupervised Learning in Molecular Biosciences

Description: This module explores techniques for understanding high-dimensional and complex data generated by high-throughput experiments. Vignettes will provide a working knowledge of dimension reduction, clustering, and machine learning applications.

Dates: 05/03/21, 05/05/21

Lecturer(s): Dr. David C. King