

Course Curriculum Committee:

Tracey Petryshen, PhD, Course Director

Radhika Khetani, PhD

Raul Mostoslavsky, MD, PhD

Judith Steen, PhD

INTRODUCTION

Speakers: Radhika Khetani (Committee Lead), Niall Lennon, Tracey Petryshen (Course Director), Judith Steen (Committee Lead)

Topics

Introduction to 'omics

Introduction to Technologies

Introduction and Overview to Data Analysis

History of Genomics, Transcriptomics, and Epigenomics

GENOMICS

Speakers: Gaddy Getz, Curtis Huttenhower, Peter Kraft, Tracey Petryshen (Course Director), Mike Talkowski, Sarah Young

Topics

Introduction to Genomics

Genome Sequencing and Annotation

Common Genetic Variation

Rare Genetic Variation

Structural Variation

Somatic Variation

Metagenomics

EPIGENOMICS

Speakers: Shannan Ho Sui, Manolis Kellis, Alex Meissner, Raul Mostoslavsky (Committee Lead), Luca Pinello

Topics

Introduction and Overview to Epigenomics

ChIP-seq Technology

DNA Methylation

Chromatin Topology Analyses

Challenges of Epigenomics Assessment

TRANSCRIPTOMICS

Speakers: Sarah Boswell, Brian Haas, Curtis Huttenhower, Radhika Khetani (Committee Lead), Rory Kirchner, Evan Macosko, Lorena Pantano, Mary Piper, Ruslan Sadreyev

Topics

Introduction to Transcriptomics

Overview of Non-Coding RNAs and iCLIP

scRNA - seq

Coding RNA and Bulk
Metatranscriptomics
Small RNA
Ribosome Profiling
Assembly and Annotation
Best Practices in Quality Control: Samples, RNA, Data
Best Practices in Methodology

PROTEOMICS

Speakers: *Nathalie Agar, Steve Carr, Amanda Guise, Matthias Mann, Hanno Steen, Judith Steen (Committee Lead), Namrata Udeshi, Hendrik Wesseling*

Topics

History of Proteomics and Metabolomics
Introduction to Proteomics
Quantitative Proteomics
Interaction Proteomics
Organellar Proteomics
Ubiquitome
Phosphoproteomics
Biomarker Analysis
MS Tissue Imaging

METABOLOMICS

Speakers: *Clary Clish, Sasha Singh*

Topics

Introduction to Metabolomics
Quality Control: Experimental Design, Materials, Methodology
Isotope Labeling, Pulse Chase Measurements, Multiplexing and Barcoding
Using Proteomics to Understand the Metabolome

DATA ANALYSIS

Speakers: *Brian Healy, Stephanie Hicks, Radhika Khetani (Committee Lead)*

Topics

The Concept of Statistical Power
Effective Sample Collection: Batching and Confounders
The Necessity of Multiple Test Correction
Required Technology Infrastructure for Analysis

INTEGRATION

Speakers: *Filippos Kottakis, Matthias Mann*

Topics

LKB1 Loss links Serine Metabolism to DNA Methylation and Tumorigenesis (case study)
Future of MS-based Proteomics

COURSE CONCLUSION

Speaker: *Tracey Petryshen (Course Director)*