

## **BIOM555 - REGULATION OF THE GENOME: SPRING 2021**

**Lectures:** VIRTUAL: Tuesdays and Thursdays: 9:00 am – 10:30 am; Tuesday, January 19 through Thursday, April 29

**Small Group Discussions:** February 2 through April 29. Students choose one discussion session and attend that session each week. Attendance and participation are required.

- A: Session 1: Thursday 11am ~ 12pm ~ TBD
- B: Session 2: Thursday 11am ~ 12pm ~ TBD
- C: Session 3: Thursday 3:30pm ~ 4:30pm ~ TBD
- D: Session 4: Thursday 3:30pm ~ 4:30pm ~ TBD
- E: Session 5: Fridays 11am - 12pm ~ TBD
- F: Session 6: Friday 11am – 12pm ~ TBD

**Exams:** 3 Exams, equal weight (25% each exam) Start at 8:30 am, end at 10:20 am. No regrading by teaching assistants. For issues with exam grades, please make an appointment with one of the course directors.

### **Course Directors:**

Roberto Bonasio: [roberto@bonasiolab.org](mailto:roberto@bonasiolab.org); 573-2598; 9-111 STRC  
Klaus Kaestner: [kaestner@penncmedicine.upenn.edu](mailto:kaestner@penncmedicine.upenn.edu); 898-8759; 12-126 STRC

### **Teaching Assistants:**

Zvi Cramer: [cramezv@penncmedicine.upenn.edu](mailto:cramezv@penncmedicine.upenn.edu)  
Brittney Allyn: [brittney.allyn@penncmedicine.upenn.edu](mailto:brittney.allyn@penncmedicine.upenn.edu)  
Rebecca Glynn: [raglynn@penncmedicine.upenn.edu](mailto:raglynn@penncmedicine.upenn.edu)  
Brittany Mactaggart: [britmact@penncmedicine.upenn.edu](mailto:britmact@penncmedicine.upenn.edu)  
Miriam Doepner: [mdoepner@penncmedicine.upenn.edu](mailto:mdoepner@penncmedicine.upenn.edu)  
Yee Hoon Foong: [yfoong@penncmedicine.upenn.edu](mailto:yfoong@penncmedicine.upenn.edu)

### **BGS Course Coordinator:**

Colleen Dunn: [dunncoll@penncmedicine.upenn.edu](mailto:dunncoll@penncmedicine.upenn.edu); 898-2792; 160 BRB II/III

### **Section 1 – Genome maintenance**

**Tuesday, January 19:** Course outline & introduction to next generation sequencing (Roberto Bonasio)

**Thursday, January 21:** DNA replication (Paul Lieberman)

**Tuesday, January 26:** Telomeres (Paul Lieberman)

**Thursday, January 28:** DNA repair and cell cycle checkpoints (Roger Greenberg)

[Thursday/Friday \(Discussion of problem set 1: DNA replication and telomeres\)](#)

**Tuesday, February 2:** Genome Editing (Jorge Henao-Mejia)

### **Section 2 – Transcription**

**Thursday, February 4:** RNAseq, GROseq, and scRNAseq (Klaus Kaestner)

[Thursday/Friday \(Discussion of problem set 2: DNA repair and Genome editing\)](#)

**Tuesday, February 9:** Eukaryotic transcription I – (Ken Zaret)

**Thursday, February 11:** Eukaryotic transcription II – (Ken Zaret)

Thursday/Friday (Discussion of problem set 3: RNA seq/Transcription I)

**Tuesday, February 16:** REVIEW SESSION FOR EXAM (TAs)

**Thursday, February 18:** **EXAM 1, VIRTUAL** (Material up to February 11, inclusive)

### **Section 3 – Chromatin Modifications**

**Tuesday, February 23:** Nucleosome structure (Ben Black)

**Thursday, February 25:** Epigenomic methods: BS-seq, CHIP-seq, ATAC-seq (Klaus Kaestner)

**Tuesday, March 2:** DNA modifications (Marisa Bartolomei)

**Thursday, March 4:** Imprinting (Marisa Bartolomei)

Thursday/Friday (Discussion of problem set 4: Nucleosome structure, epigenomic methods)

**Tuesday, March 9:** Histone marks (Roberto Bonasio)

### **Section 4 – Chromatin Regulation**

**Thursday, March 11:** Polycomb (Roberto Bonasio)

Thursday/Friday (Discussion of problem set 5: DNA modifications; Histones and Chromatin)

**Tuesday, March 16:** Trithorax and chromatin remodeling (Roberto Bonasio)

**Thursday, March 18:** Analysis of higher-order chromatin structure:3C, 4C, HiC, FISH (Babak Faryabi)

Thursday/Friday (Discussion of problem set 6: Histones, Chromatin, Polycomb)

**Tuesday, March 23:** Nuclear organization (Gerd Blobel)

**Thursday, March 25:** REVIEW SESSION FOR EXAM (TAs)

Thursday/Friday (Discussion of problem set 7: Trithorax, chromatin higher order structure and topology)

### **Section 5 – Coding and noncoding RNA regulation**

**Tuesday, March 30:** **EXAM 2, VIRTUAL** (Material up to March 23)

**Thursday, April 1:** RNA-centric techniques: CLIP-seq, CHIRP-seq, SHAPE-seq etc (Colin Conine)

**Tuesday, April 6:** Small RNAs (Colin Conine)

**Thursday, April 8:** Long non-coding RNAs (Colin Conine)

Thursday/Friday (Discussion of problem set 8: RNA centric techniques)

**Tuesday, April 13:** RNA processing (Kristen Lynch)

**Thursday, April 15:** RNA modifications (Kristen Lynch)

Thursday/Friday (Discussion of problem set 9: Small and long non-coding RNAs)

**Tuesday, April 20:** RNA localization (Peter Klein)

**Thursday, April 22:** Translational control (Peter Klein)

Thursday/Friday (Discussion of problem set 10: (RNA modifications and processing)

**Tuesday, April 27:** REVIEW SESSION FOR EXAM (TAs)

**Thursday, April 29:** **EXAM 3, IN CLASS**

### **General References for Review (Library/Web)**

Molecular Biology of the Cell (Alberts et al.)

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=mboc4.TOC&depth=10>

Molecular Cell Biology Lodish et al. (older editions are by Darnell et al.)

<http://www.ncbi.nlm.nih.gov:80/books/bv.fcgi?call=bv.View..ShowTOC&rid=mcb.TOC>

Genes VIII Benjamin Lewin

**Email addresses for lecturers**

Marisa Bartolomei: [bartolom@penncmedicine.upenn.edu](mailto:bartolom@penncmedicine.upenn.edu)  
Ben Black: [blackbe@penncmedicine.upenn.edu](mailto:blackbe@penncmedicine.upenn.edu)  
Gerd Blobel: [blobel@email.chop.edu](mailto:blobel@email.chop.edu)  
Roberto Bonasio: [roberto@bonasiolab.org](mailto:roberto@bonasiolab.org)  
Colin Conine: [Conine@penncmedicine.upenn.edu](mailto:Conine@penncmedicine.upenn.edu)  
Babak Faryabi: [faryabi@penncmedicine.upenn.edu](mailto:faryabi@penncmedicine.upenn.edu)  
Roger Greenberg: [rogergr@penncmedicine.upenn.edu](mailto:rogergr@penncmedicine.upenn.edu)  
Jorge Henao-Mejia: [jhena@penncmedicine.upenn.edu](mailto:jhena@penncmedicine.upenn.edu)  
Klaus Kaestner: [kaestner@penncmedicine.upenn.edu](mailto:kaestner@penncmedicine.upenn.edu)  
Peter Klein: [pklein@penncmedicine.upenn.edu](mailto:pklein@penncmedicine.upenn.edu)  
Paul Lieberman: [lieberman@wistar.org](mailto:lieberman@wistar.org)  
Kristen Lynch: [klync@penncmedicine.upenn.edu](mailto:klync@penncmedicine.upenn.edu)  
Ken Zaret: [zaret@upenn.edu](mailto:zaret@upenn.edu)