
COURSE INFORMATION

Lectures: Tuesdays and Thursdays: 8:30 am – 10:00 am; Tuesday, January 18 through Thursday, April 25. Classes are in person in the Austrian Auditorium of CRB, unless otherwise noted.

Small group discussions: **Thursday, January 25 through Friday April 19.** Students choose one discussion session and attend that session each week. Attendance and participation are required.

Session 1: Thursdays	10:00 am – 11:00 am	TA TBA; 1403 BRB
Session 2: Thursdays	10:00 am – 11:00 am	TA TBA; 1413 BRB
Session 3: Thursdays	3:30 pm – 4:30 pm	TA TBA; 301 BRB
Session 4: Thursdays	3:30 pm – 4:30 pm	TA TBA; 701 BRB
Session 5: Fridays	11:00 am – 12:00 pm	TA TBA; 104 SCL
Session 6: Fridays	11:00 am – 12:00 pm	TA TBA; 204 SCL
Session 7: Fridays	3:30 pm – 4:30 pm	TA TBA; 301 BRB
Session 8: Fridays	3:30 pm – 4:30 pm	TA TBA; 801 BRB

Exams: There will be three exams, February 22, March 28, and April 30 from 8:00 am – 10:00 am. Exams will be taken on Canvas in presence of the TA's. The exams will be in "open note" format. You can bring and consult your notes from class but not use textbooks or the internet.

Final grade: The final grade for the course is a composite of the three exams, each counting for 25%, and a grade given by the TA's for class participation during the small group discussions, which counts for the remaining 25%. Final scores ≥ 90 will be given an "A", between 80 and 89.9 a "B", and scores below 80 a B- or a C. In prior years, the mean final score was ~ 87 and the median ~ 88 . Should the mean and median be significantly lower this year, the course director will consider adjustments to the grading scheme in favor of the class.

Office hours: There are no formal office hours. The course director and TA's will answer questions and concerns about the course after the lectures or during the small group discussions.

Course Director:

Roberto Bonasio: roberto@bonasiolab.org

Teaching Assistants:

Kelly Clark:	Kelly.Clark1@penntestmed.upenn.edu
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BGS Course Coordinator:

Colleen Dunn: dunncoll@penntestmed.upenn.edu; 898-2792; 160 BRB II/III

LECTURE SCHEDULE

Section 1 – Genome maintenance

Thursday, January 18: Course outline & introduction to next generation sequencing (Roberto Bonasio)

Tuesday, January 23: DNA replication (Paul Lieberman)

Thursday, January 25: Telomeres (Roger Greenberg)

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

Tuesday, January 30: DNA repair and cell cycle checkpoints (Roger Greenberg)

Thursday, February 1: Genome Editing (Ophir Shalem)

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

Section 2 – Transcription

Tuesday, February 6: Transcriptomics and epigenomics (Klaus Kaestner)

Thursday, February 8: Single-cell and spatial sequencing (Klaus Kaestner)

[Thursday/Friday \(Discussion of problem set 3: Genome editing & transcriptomic + epigenomic\)](#)

Tuesday, February 13: Eukaryotic transcription (Ken Zaret)

Section 3 – Histones

Thursday, February 15: Nucleosome structure (Ben Black)

[Thursday/Friday \(Discussion of problem set 3: Single-cells & transcription \)](#)

Tuesday, February 20: REVIEW SESSION FOR EXAM (TAs)

Thursday, February 22: **EXAM 1**; Smilow Auditorium – 8:00 am – 10:00 am

Tuesday, February 27: Histone marks (Roberto Bonasio)

Thursday, February 29: Polycomb (Roberto Bonasio)

[Thursday/Friday \(Discussion of problem set 4: Nucleosomes & histone marks\)](#)

Tuesday, March 5: Trithorax and chromatin remodeling (Roberto Bonasio)

Section 4 – DNA modifications and 3D organization

Thursday, March 7: Methods to study the genome in 3D (Eric Joyce)

[Thursday/Friday \(Discussion of problem set 5: Polycomb & spatial trithorax\)](#)

Tuesday, March 12: Chromatin topology and nuclear organization (Gerd Blobel)

Thursday, March 14: DNA modifications (Marisa Bartolomei)

[Thursday/Friday \(Discussion of problem set 6: 3D genome\)](#)

Tuesday, March 19: Genomic imprinting and dosage compensation (Marisa Bartolomei)

Thursday, March 21: Transposable elements (Andrew Modzelewski)

[Thursday/Friday \(Discussion of problem set 7: DNA modifications & imprinting\)](#)

Tuesday, March 26: REVIEW SESSION FOR EXAM (TAs)

Thursday, March 28: **EXAM 2**; BRB Auditorium – 8:00 am – 10:00 am

Section 5 – Coding and noncoding RNA regulation**Tuesday, April 2:** Long non-coding RNAs (Montserrat Anguera)**Thursday, April 4:** Small RNAs and RNA interference (Colin Conine)[Thursday/Friday \(Discussion of problem set 8: Transposons and lncRNAs\)](#)**Tuesday, April 9:** RNA processing (Kristen Lynch)**Thursday, April 11:** RNA modifications (Kristen Lynch)[Thursday/Friday \(Discussion of problem set 9: small RNAs & RNA processing\)](#)**Tuesday, April 16:** Translational control (Peter Klein)**Thursday, April 18:** RNA stability and localization (Peter Klein)[Thursday/Friday \(Discussion of problem set 10: RNA modifications & translational control\)](#)**Tuesday, April 23:** Transgenerational epigenetics & course conclusion (Roberto Bonasio)**Thursday, April 25:** REVIEW SESSION FOR EXAM (TAs)**Tuesday, April 30:** **EXAM 3**; Smilow Auditorium – 8:00 am – 10:00 am**General references for review (library/web)**

Lewin's Genes XII (Krebs, Goldstein, Kilpatrick)

Epigenetics, 2nd edition (Allis, Jenuwein, Reinberg)**Email addresses for lecturers**Montserrat Anguera: anguera@vet.upenn.eduMarisa Bartolomei: bartolom@penncmedicine.upenn.eduBen Black: blackbe@penncmedicine.upenn.eduGerd Blobel: BLOBEL@chop.eduRoberto Bonasio: roberto@bonasiolab.orgColin Conine: conine@upenn.eduRoger Greenberg: rogergr@penncmedicine.upenn.eduEric Joyce: erjoyce@penncmedicine.upenn.eduKlaus Kaestner: kaestner@penncmedicine.upenn.eduPeter Klein: pklein@penncmedicine.upenn.eduPaul Lieberman: lieberman@wistar.orgKristen Lynch: klync@penncmedicine.upenn.eduAndrew Modzelewski: amodz@vet.upenn.eduOphir Shalem: shalemo@penncmedicine.upenn.eduKen Zaret: zaret@penncmedicine.upenn.edu**Good research practices:** BGS requires its doctoral students to be trained in i) Responsible Conduct of Research (RCR), and ii) Scientific Rigor and Reproducibility (SRR) (<https://www.med.upenn.edu/bgs-rcr-exdes/>). Course content is designed to complement RCR and SRR efforts.**COVID-19 policy:** There are no longer University-wide mandates, but we kindly request that if you are sick you take a good rest and consider watching the lectures and joining the small group session remotely. If you must participate in person while sick, please wear a good mask.**ChatGPT policy:** just don't.