EPI 249: Molecular Biology for Epidemiologists
Fall 1 2022, 2.5 credits

Dates: August 31, 2022 - October 21, 2022
Time: Wednesdays and Fridays, 11:30AM to 1:00PM
Place: Kresge G3 (Week 1 & Week 2); KRSG 502 (Kresge)

Primary Instructor: Immaculata De Vivo
Email: devivo@channing.harvard.edu
OH: by appointment

Visiting Lecturers: Marta Crous-Bou
   martacrousbou@gmail.com
   Margaret Du
   dumeng@mskcc.org
OH: by appointment

TA: Ruitong Li
Email: ruitongli@g.harvard.edu
OH: TBD (Epi library, Kresge 907)
   (Other times available by appointment)

Reading List
Recommended text (on reserve at Countway Library):

Supplementary materials:
- Supplementary movies at https://www.labxchange.org
- Supplementary reading list posted on course website (articles accessible through provided links)
Objectives

By the end of this course, students should be able to:
- Understand the mechanisms and regulatory processes involved in different steps of the central dogma of molecular biology
- Understand how cellular mechanisms go awry and how cells can repair these
- Gain a basic understanding of Mendelian and non-Mendelian genetics, meiosis, and mitosis
- Be familiar with the advantages and disadvantages of various molecular tools and study designs commonly used in molecular epidemiology research

Outcome Measures

Problem sets (distributed and submitted on paper in class)
- Problem set #1 (due 9/28/2022) = 30%
- Problem set #2 (due 10/26/2022) = 30%

Quizzes (in class)
- Quiz #1 (9/21/2022) = 20%
- Quiz #2 (10/21/2022) = 20%

For problem sets, students are welcome to reference texts or class notes, use the internet, or discuss with classmates, but the final submission must be the student’s own work.

Default grading for this course is ordinal grading. Please talk to the TA (Ruitong Li, ruitongli@g.harvard.edu) if you have any questions.
**Course Schedule**

**W: 8/31**  
Course outline / Molecular Biology: DNA structure (Ch. 1)

**F: 9/2**  
DNA structure (cont’d) / DNA replication and telomeres / DNA transcription (Ch. 1)

**W: 9/7**  
DNA transcription / translation (Ch. 1)

**F: 9/9**  
Translation (cont’d) (Ch. 1)

**W: 9/14**  
Gene regulation (Ch. 1)

**Problem set #1 distributed**

**F: 9/16**  
Gene regulation (cont’d) (Ch. 1, 11)

**W: 9/21**  
Gene structure (Ch. 1, 2, 9)

Mitosis / Meiosis / Mendelian genetics (Ch. 2, 3)

**F: 9/23**  
**Quiz #1** (covers material through 9/16)

**W: 9/28**  
Non-Mendelian Genetics (Ch. 3, 14, 15) (Margaret Du)

**Problem set #1 DUE**

**F: 9/30**  
DNA mutation and DNA repair (Ch. 13)

**W: 10/5**  
Epigenetics (methylation, imprinting) (Marta Crous-Bou) (Ch. 11)

**F: 10/7**  
Classic molecular biology tools (Sanger, PCR)

**W: 10/12**  
Classic molecular biology tools (cont’d: cloning, blotting, microarrays, CRISPR)

**F: 10/14**  
Modern molecular tools in population studies  
(Taqman, Illumina, Next-generation sequencing / Copy number variations / How to choose a tool?)

(*Marta Crous-Bou/ Dr. De. Vivo) (Ch. 7, 8, 18)

**Problem set #2 distributed**

**W: 10/19**  
The genome and beyond (Margaret Du)

**F: 10/21**  
**Quiz #2** (covers material from 9/23 to 10/19)

(10/26 **Problem set #2 DUE**)