

## Bi 424/524 Advanced Molecular Genetics: Epigenetics Spring 2019

**Instructor:** Eric Selker email: selker@uoregon.edu; office: 355D Streisinger; phone: 346-5193

**Monday and Wed. 14:00-15:20** (B042 Price Science Commons)

Office hours: Fridays 4-6PM and by appointment. PDFs of most readings will be available via Canvas.

- April 1 (M) Lecture: **Epigenetics overview/The Ghost in Your Genes**
- April 3 (W) Lecture: **Chromatin Structure overview**
- April 8 (M) Discussion of: **Jamieson K, McNaught KJ, Ormsby T, Leggett N, Honda S, Selker EU. (2018) Telomere repeats induce domains of H3K27 methylation in Neurospora. *Elife* Jan 3;7**
- April 10 (W) Lecture: **Polycomb/Trithorax system** (Dr. Tish Wiles)
- April 15 (M) Discussion of: **Laprell F, Finkl K, Müller J. (2017) Propagation of Polycomb-repressed chromatin requires sequence-specific recruitment to DNA. *Science* 356:85–8.**
- April 17 (W) Lecture: **PEV (position effect variegation) in Drosophila**
- April 22 (M) Discussion of: **Akhtar et al. (2013) Chromatin position effects assayed by thousands of reporters integrated in parallel. *Cell* 154 : 914-927.**
- April 24 (W) Lecture: **Gene silencing in yeasts**
- April 29 (M) Discussion of: **Ragunathan K, Jih G, Moazed D. (2015) Epigenetic inheritance uncoupled from sequence-specific recruitment. *Science* 348(6230):1258699–9; and Audergon PNCB, Catania S, Kagansky A, Tong P, Shukla M, Pidoux AL, Allshire RC. (2015) Restricted epigenetic inheritance of H3K9 methylation. *Science* 348:132–5.**
- May 1 (W) Lecture: **DNA methylation**
- May 6 (M) Discussion of: **Bourc'his, D. and T.H. Bestor. (2004) Meiotic catastrophe and retrotransposon reactivation in male germ cells lacking Dnmt3L. *Nature* 431: 96-9 and Bourc'his, D., G.L. Xu, C.S. Lin, B. Bollman, and T.H. Bestor. (2001) Dnmt3L and the establishment of maternal genomic imprints. *Science* 294: 2536-9.**
- May 8 (W) Lecture: **Gene silencing in filamentous fungi**
- May 13 (M) Discussion of: **Shiu, P. K., Raju, N. B., Zickler, D., and Metzberg, R. L. (2001) Meiotic silencing by unpaired DNA. *Cell* 107, 905-16. *Background paper:* Aramayo, R., and Metzberg, R. L. (1996) Meiotic transvection in fungi. *Cell* 86, 103-113.**
- May 15 (W) Lecture: **Imprinting and X-inactivation**
- May 20 (M) Discussion of: **Inoue A, Jiang L, Lu F, Suzuki T, Zhang Y. (2017) Maternal H3K27me3 controls DNA methylation-independent imprinting. *Nature* 547:419–24.**
- May 22 (W) Lecture: **Gene silencing in plants**
- May 27 (M) Memorial Day Holiday
- May 29 (W) Talks and discussions on term paper topics
- June 3 (M) Talks and discussions on term paper topics
- June 5 (W) Lecture: **Epigenetics and Human Disease** (Dr. Vincent Bicocca)

## Advanced Molecular Genetics: Epigenetics (Bi 424/Bi 524) Spring 2019

**Instructor: Eric Selker** (selker@uoregon.edu); office hours: Fri. 4-6 and by appt. 355D Streisinger  
Class meetings: Mondays and Wednesdays 14:00-15:20 in B042 Price Science Commons

**Course objectives, format, requirements and grading:** The purpose of the course is to provide for in-depth study of advanced topics in genetics. Lectures will serve primarily to introduce topics. About one third of class meetings will be used for organized discussions on readings from the primary scientific literature. Students will serve as leaders for the corresponding discussion. Written responses to questions on the readings, in the format of a problem set, will be due at the beginning of each of the discussion periods. There will be occasional quizzes but no mid-term or final exam. A term paper in the form of a research proposal related to a topic of the course will be due on Monday of finals week (i.e. June 10). *Please submit it both by email and as a hard copy.* Two class meetings (May 29 & June 3) will be devoted to small group discussions of each student's term paper topic. Written summaries (no more than one page; please make 5 copies for distribution or email to instructor and members of your group) will be due 48 hours before the first discussion (i.e. by 2PM on May 27<sup>th</sup>; note that this is a holiday so you may want to send it earlier). Students enrolled in Bi524 will be expected to present their proposal orally (8-10 minutes each) to the entire class; Bi424 students will be encouraged to presenting orally as well though the talks will be even briefer (4-5 min). And all will have an opportunity to discuss their projects in groups of students. The course will be limited to 25 students and will only be offered on a graded basis. Grading will be based on instructor's assessment of individual achievements in the following areas and will be weighted as indicated:

problem sets	35%
oral presentations and discussions	20%
written research proposal (term paper)	30%
quizzes	15%

**Readings:** There will be no textbook. PDF copies of primary discussion papers will be PDFs of most readings will be available via Canvas and much of this will be required reading (TBA). Additional papers may also be required reading and PDFs will normally be made available via Canvas. Supplemental readings may be suggested by the instructor and/or the discussion leaders.

### Discussions and problem set logistics:

-Discussion leaders must arrange a meeting ("pre-discussion") with the instructor, e.g. on Friday before the Monday discussion (typically at 4 or 5 PM in Selker's office, which is Streisinger 355D).  
-Problem sets will normally be handed out in the class period before the associated Discussion and will be due at start of the Discussion period; no credit will be given for late assignments.

**Term paper and related oral presentation:** This is similar to the research proposal part of a typical graduate student "comprehensive exam" or for application for a NSF Predoctoral Fellowship (which I encourage you consider applying for if you are planning on going to graduate school); it should be 1500 words or less for Bi424 and 2000 words or less for Bi524. This brief synopsis of what NSF requires is pertinent:

"Describe the research idea, your general approach, as well as any unique resources that may be needed for accomplishing the research goal... Address the potential of the research to advance knowledge and understanding within science".

The primary purpose of writing this research proposal is to gain experience identifying an interesting biological problem, proposing hypotheses or models to explain or solve the problem and designing experiments to test the hypotheses. Any topic discussed or related to those in the course is acceptable. Please note that the term paper is not only a scientific exercise; it is a writing exercise as well. Think carefully about what you want to say; say it logically and concisely. After you are satisfied with your paper, put it down (e.g. 1-2 days) and then reread it critically to see if you can improve it. You should put it through at least two drafts. The final copy should be printed double-spaced. Grading will be principally on the scientific merits of your ideas but writing quality will "count" as well, much as it does when a paper is being reviewed for publication or when a grant is being reviewed for possible funding. Both the proposal and the oral talk about the proposed research should include background to put the proposed work in context and should be fully referenced as in a published paper.

**Term papers will be due at 5 PM Monday June 10th and should be both emailed (selker@uoregon.edu) and provided as a hard copy (to Selker's office or to his mailbox in the Institute of Molecular Biology).**