

Bi 424/524 Advanced Molecular Genetics: Epigenetics Spring, 2014

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

Wed. 14:00-15:20 (CON 106); **Mon. 16:00-17:20** (CON 360) office hours: Fridays 4-6PM and by appt.

- April 2 (W) Lecture: **Epigenetics/Chromatin Structure overview**
- April 7 (M) Discussion of: **Greer et al. (2011) Transgenerational epigenetic inheritance of longevity in *Caenorhabditis elegans*. *Nature* 479: 365-371.**
- April 9 (W) Lecture: **Polycomb/Trithorax system** (Guest lecture by Dr. Tish Wiles)
- April 14 (M) Discussion of: **Hansen, K.H., Bracken, A.P., Pasini, D., Dietrich, N., Gehani, S.S., Monrad, A., Rappsilber, J., Lerdrup, M., and Helin, K. (2008). A model for transmission of the H3K27me3 epigenetic mark. *Nat Cell Biol* 10, 1291-1300. and: Petruk et al. (2012) TrxG and PcG Proteins but Not Methylated Histones Remain Associated with DNA through Replication. *Cell* 150: 922-933.**
- April 16 (W) Lecture: **PEV (position effect variegation) in *Drosophila***
- April 21 (M) Discussion of: **Akhtar et al. (2013) Chromatin position effects assayed by thousands of reporters integrated in parallel. *Cell* 154 : 914-927.**
- April 23 (W) Lecture: **Gene silencing in yeasts** (Guest lecture by Dr. Andrew Klocko)
- April 28 (M) Discussion of: **Bayne et al. (2010) Stc1: A Critical Link between RNAi and Chromatin Modification Required for Heterochromatin Integrity. *Cell* 140: 666-677.**
- April 30 (W) Lecture: **DNA methylation**
- May 5 (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 7 (W) Lecture: **Gene silencing in filamentous fungi**
- May 12 (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 14 (W) Lecture: **Imprinting and X-inactivation**
- May 19 (M) Discussion of: **Engreitz et al. (2013) The Xist lncRNA exploits three-dimensional genome architecture to spread across the X chromosome. *Science* 341: 1237973**
- May 21 (W) Lecture: **Gene silencing in plants**
- May 26 (M) Memorial Day Holiday
- May 28 (W) Lecture: **Epigenetics and Human Disease** (Guest lecture by Dr. Vincent Bicocca)
- June 2, 4 Talks and discussions on term paper topics; Term papers due 5PM June 9th.

Advanced Molecular Genetics: Epigenetics (Bi 424/Bi 524) Spring 2014

Instructor: Eric Selker (selker@uoregon.edu); office hours: Fri. 4-6 and by appt. 355D Streisinger
Class meetings: Wednesdays 14:00-15:20 in 106 Condon, Mondays 16:00-17:20 in 360 Condon

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 will be due at the beginning of each of the discussion periods. There will be occasional quizzes but no mid-term exam. A term paper in the form of a research proposal related to a topic of the course will be due on Wednesday of finals week. **Please submit it both by email and as a hard copy.** The final two class meetings (June 2 & 4) will be devoted to group discussions of each student's term paper topic. Written summaries (no more than one page; please make 5 copies for distribution) will be due at the beginning of the previous class period (May 28th). Students may have the option of presenting their proposal orally (10 minutes each) to the entire class but most will discuss their projects in groups of four students. The course will be limited to 22 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/final exam	15%

Readings: There will be no textbook. Copies of primary discussion papers will be placed in the reading room in Streisinger Hall and are required reading. Additional papers may also be required reading, including background chapters of Epigenetics textbook. Whenever possible, PDFs will also be made available on Departmental server (password: **bi424student**). 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.

-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" (we can discuss this) but it should be 2000 words or less. 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; you are encouraged to email the instructor a brief (few sentence) description of your proposed project. A selection of excellent papers that are relevant to the course but that will not be specifically addressed in the course may be made available. 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) then reread it critically and 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.

Term papers will be due at 5 PM Monday June 9th and should be both emailed (selker@uoregon.edu) and provided as a hard copy (to Selker's office or to his mailbox in Biology or IMB)