Course Schedule: Tuesdays 2:00-4:50p. Classroom: Bassine 208

Office Hours by Appointment: Email the instructor – nlau@brandeis.edu

Course Description
Prerequisite: BIOL14a and BIOL 15b (or BIOL 18a and BIOL22a,) or BIOL105b, Molecular Biology.
This seminar course will be a weekly discussion of primary literature that broadly covers key breakthroughs in this important area of (epi) genetics and molecular biology.

Course Narrative and Learning Goals:
Although DNA is the ultimate storage of our genes, is a key determinant of heredity, and is the basis for the study of Genetics, the reality of gene regulation is actually much more complex. Epigenetics (“above the genes”) is the study of the regulation of gene expression beyond the sequence of the DNA, where the inheritance of traits can occur via mechanisms like DNA methylation, histone modifications, alterations in chromatin conformation, rearrangements of chromosomes, and transmission of non-DNA molecules like RNA and prion proteins. Drawing on readings from the primary literature, we will explore the molecular mechanisms underlying a diverse array of epigenetic phenomena, such as genetic imprinting, dosage compensation, genome rearrangements, and the histone code. Finally, the importance of Epigenetics and its impact on human disease, animal development, and organismal evolution will be discussed.

Structure of course: Prior to the next class, 2 to 3 recent papers related to the topic of the days class will be posted and assigned, and 2 students will sign up for preparing a ~30 minute lecture each providing the background and framework leading up to the discussion of the paper. The figures, results and conclusions of each paper will then be discussed and debated, with frequent In-class questions to students.

In-Class Student Presentations (35% of final grade):
Students must sign up for at least two and perhaps three papers during the semester to present their ~30 min discussion lecture. ALL student lectures will be judged on the presentations’ clarity, organization and comprehensiveness. Presenters should provide a thorough introduction to each paper, stand ready to explain each key figure to clarify to the audience, and provide their opinion of the paper’s impact at the end of the discussion. The Key exercise is learning WHAT is IMPORTANT in the scientific endeavor and gaining the proper appreciation of this field.

Attendance and Participation (65% of final grade):
This class only meets once a week, so attendance and participation are mandatory and play heavily in the calculation of your grade. During the paper discussions, audience students will take turns explaining the meaning of each figure, and then compared to the presenting student’s opinion. Attendance will be recorded for each class, and the instructor will take note of students who either are not engaged in the paper’s discussion, or are not properly prepared to answer questions posed during class.

ABSENCES AND LATENESS: Students will Not Pass this course if they miss more than 2 class dates, or if they miss more than 1 class date for which they were scheduled to present an Introduction lecture. For any missed class, the student must make up the class by submitting an 800-1000 word (2 page) synopsis of the papers from the missed class, and this synopsis must be submitted by the next class. The make-up synopsis assignment will prevent an automatic letter grade deduction, but does not absolve the requirement to not
miss any class dates. Synopses that are poorly written and not factually accurate will not be accepted as a satisfactory make-up work.

Any Tardiness beyond 30 minutes (or consecutive class tardiness beyond 15 minutes) will be considered a class absence that can be made up by submitting a make-up synopsis assignment the next class, but will be noted in the tally.

**Academic integrity:** All students will be held to the rules of conduct detailed in the ‘Rights and Responsibilities’ handbook. Cheating or plagiarism will be handled according to the handbook.

**Students with disabilities:** If you are a student with a documented disability at Brandeis University, and wish to have a reasonable accommodation made, please speak with me immediately.

**Check LATTE Course Website for access to papers.**

Week 1 (1/13): Epigenetics Introduction and Presentation tutorial

Week 2 (1/20): The Histone Code

Week 3 (1/27): Chromatin, Polycomb and Trithorax

Week 4 (2/3): Long Non-coding RNAs and Dosage Compensation

Week 5 (2/10): Small RNAs and RNA interference

(2/17) **No Class – Presidents Week Break**

Week 6 (2/24): DNA Methylation

Week 7 (3/3): Variegation and Paramutation

Week 8 (3/10): Transgenerational epigenetics and metabolism

Week 9 (3/17): Imprinting and Monoallelic Gene Expression

Week 10 (3/24): Prions and pathogens

Week 11 (3/31): Epigenetics in Stem Cells and Development

(4/7) **No Class – Passover & Easter Break**

Week 12 (4/14): Epigenetics in Cancer and Disease

Week 13 (4/21): Epigenetics in Behavior and the Brain

The required reading are the review articles and main subject articles, available on Latte and through Pubmed. There is an optional textbook that would complement this course, Epigenetics, Second Edition, but its release is due February 2015 $132.00 ISBN 978-1-936113-59-0