BIMM 194 – Molecular Biology of Insects
Winter 2020

Location: York 3010

Date/Time: Thursdays from 3:30pm-4:45pm

Instructor: Prof. Omar Akbari

Course Summary: This course covers biotechnology applications as applied to Insects.

Prerequisites: BIMM100 (Molecular Biology), and its prerequisites.

Lectures: Each class will consist of presentation and discussion of one paper related to insect biotechnology. Selected papers will be assigned in advance and need to be read before class by **everyone**. To facilitate discussion, I will assign each paper to a group of ~4 students who will be responsible for knowing that paper in great depth. These students will be required to prepare a PowerPoint presentation and to walk us through the background, main points in the paper, discussion and conclusions.

For your assigned paper, I will expect you to be able to lead us through:

1) What is the context for the paper and the general questions the authors set out to answer?
2) For each figure: what is the specific question, what are the methods, what are the results, what can/did the authors conclude?
3) What are the primary conclusions of the data from the entire paper?
4) What is the take home message of paper and how does it contribute to the field?

Background/Introduction: Offer the necessary background to provide context for the paper. i.e. What are the authors attempting to show? How does this work fit into the broader view of the field? What tools are used to approach the problem?

Discussion of Data/Results: Provide a thorough description of the techniques employed in the paper. Describe the specific experiments, highlighting any controls that are important for the interpretation of the data. Summarize the results of the experiment, including whether what you observe within the provided figures actually supports (or not) what the author's write in the text. Discuss any reservations you may have about the data. Figures should be divided between members of the group.

Conclusions and implications: Discuss the major conclusions from the findings presented in the paper. Where possible, include a model (often included at the end of the paper) to provide an overview of the findings. Discuss any caveats to the interpretation, and discuss the long-term implications of the work. There are four major questions should be addressed during the presentation: 1. What is the most important conclusion and take home message? 2. What is the most critical experiment that supports their main conclusion? 3. Are there major caveat in the study? 4. What are the most important follow up questions that should be addressed?

Quizzes: There will be nine quizzes, one every week (except the first week) at the end of each class. They will consist of questions regarding the material. Questions will be related to conclusions or concepts emphasized during the presentation. Each quiz will count for 5% of your grade. One quiz can be dropped (lowest score) and therefore there will be no makeups for quizzes.

Participation: Questions, comments, suggestions are encouraged at any time during the lecture.

Grading: You grade will be a reflection of your quiz scores (40%), your ability to lead us through your assigned paper (50%), and your overall participation in weeks for which you are not part of the assigned group (10%).

The grading will be normalized to the highest score. 60-70% of that score will be a D, 70-80% will be a C, 80-90% will be a B and 90-100% of that an A.

Email communication: oakbari@ucsd.edu is the appropriate email for all correspondence.
Please remember to include your first and last name in the body of the email and WRITE BIMM194 IN E-MAIL SUBJECT (your e-mail will not be read if you do not write that). Questions that can be asked before or after lecture should not be asked and will not be answered by e-mail.

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Tentative Winter 2020 Class Schedule/Papers:

Class 1 – January 9th: Introductions, General overview of Class, Content, Grading, Papers, Assign groups etc..

Class 2 - January 16th: Fu G, et al. (2010) Female-specific flightless phenotype for mosquito control. PNAS

Class 3 - January 23rd: Chen et al. (2007). A synthetic maternal-effect selfish genetic element drives population replacement in Drosophila. Science.

Class 4 - January 30th: Buchman et al. (2018). Engineered Reciprocal Chromosome Translocations Drive High Threshold, Reversible Population Replacement in Drosophila. ACS Synthetic Biology.

Class 5 – February 6th: Mali et al. (2013). RNA-Guided Human Genome Engineering via Cas9 (Science)

Class 6 - February 13th: Grantz V. and Bier. E., (2015). Genome editing. The mutagenic chain reaction: a method for converting heterozygous to homozygous mutations.

Class 7 - February 20th: Gantz VM, Jasinskiene N, Tatarenkova O, Fazekas A, Macias VM, Bier E, James AA. (2015) Highly efficient Cas9-mediated gene drive for population modification of the malaria vector mosquito *Anopheles stephensi*. PNAS

Class 8 - February 27th: Kyrou et al. (2018). A CRISPR–Cas9 gene drive targeting *doublesex* causes complete population suppression in caged *Anopheles gambiae* mosquitoes. Nature Biotechnology

Class 9 – March 5th: Oberhofer et al. (2019). Cleave and Rescue, a novel selfish genetic element and general strategy for gene drive. PNAS

Class 10 – March 12th: Kandul et al. (2019).Transforming insect population control with precision guided sterile males with demonstration in flies. Nature Communications.

No final Exam