GENE 440 – Genetics Seminar

4:30-5:30 pm W
Skeen Hall Rm W139
Spring Semester, 2020

Instructor: Dr. Ian Ray Rm N342, Skeen Hall
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Office Hours: M, 3:00-6:00 pm and by appointment.

Textbook: Assigned articles

Course Goals: To critically review and discuss scientific literature associated with the use of model microorganism, plant, or animal systems to solve problems in molecular, cellular, and developmental biology. Students will also organize, prepare, and deliver a presentation on a selected topic in the field of genetics, as described below.

Presentation: Each student must develop a **10 to 15 minute Powerpoint® presentation** describing research which CLEARLY demonstrates that a specific candidate gene influences a unique phenotype/trait in a **MODEL organism** (e.g., yeast, mouse, humans, Zebrafish, Arabidopsis, etc.). For example, a gene influencing Alzheimer's disease in humans, or a cell surface receptor gene that influences flower development in plants, etc. The **Introduction (worth 10pts)** should briefly (~2 minutes) describe the trait, why it is important, and why the gene to be discussed was considered a potential candidate. The **Methods/ Experimental Approach (worth 10pts)** should briefly (~3 minutes) **list** the various techniques and approaches used to generate the experimental evidence that will be presented to the class. Note: You do not have to explain these methodologies in detail, as the class should have sufficient background knowledge about most of these techniques. However, a brief explanation of the type of information provided by each of the techniques (i.e., why it was useful or important) is certainly appropriate. **Results & Discussion (worth 40pts)** should comprise the bulk of your presentation (~9 minutes). It should provide the most convincing evidence (data, figures, etc.) that demonstrates the candidate gene impacts the trait of interest. In this regard, demonstrating phenotypic impacts of knockout (via traditional homologous recombination repair or error-prone CRISPR-Cas9 nonhomologous end-joining repair), RNA interference, or transgenic complementation experiment results are highly recommended. Evidence must also be provided demonstrating that at least one other protein was identified which physically interacts with the candidate gene's protein (i.e., immuno-precipitation, yeast two-hybrid, FLIM/FRET, or other suitable assays). You are encouraged to include pertinent figures and data tables from the articles that you have reviewed, **just be sure to cite the source of each figure or table**. Be sure to mention where the gene is located in the organism's genome, the size of the gene and its gene products, and if known, where the candidate protein functions at the cellular/organism level (see attached pages). Given the presentation time limit, you will not be able to discuss everything about your candidate gene. So be sure to focus on the most important information/concepts. **Conclusions (worth 10pts)** should highlight the most important findings of your talk (~1 minute) and cite the papers that provided data for your presentation. **The following three components of your presentation will also be worth 7 points each** including: 1) visual appeal, 2) clarity/organization, 3) delivery volume and eye contact. **Meeting the time limit (worth 9 pts):** As a professional courtesy to other speakers, it is important not to exceed the allotted time limit. In this regard, you will be granted a ± 1 minute grace period, but will lose 5 points for each minute that your talk is over or under the 10 to 15 minute time limit. **A single page abstract summarizing your presentation is also required.** The abstract (1 inch page margins and 12pt font) should include your presentation title and your name at the top of the page (centered), followed by the abstract body (**200 words maximum, double spaced**). The abstract will be graded based on: informative title, grammar, and flow (10pts each) and content (70pts).

Grading: Class attendance and participation in weekly discussions of assigned journal articles will **each** comprise 20% of the course grade. The final presentation (worth 50% of the course grade) will be delivered to the class on May 6 or 13 (I will need 3 volunteers for May 6). One **hardcopy abstract** that summarizes key features of your presentation (worth 10% of the course grade) will also be due on May 13.

DATE TOPIC AND ASSIGNED READING .

Jan. 22 Characteristics of effective presentations
29 Yeast two-hybrid system (Fields and Song 1989 & Sobhanifar 2003ab)
Feb 5 Involvement of the TRAP220 component of the TRAP/SMCC coactivator complex in embryonic development... (Ito et al. 2000). Also, handout overview of stem cell HR knockout process.
12 **The mediator complex functions as a coactivator for GATA-1 in erythropoiesis via subunit Med1/TRAP220 (Stumpf et al. 2006)**
19 The mediator complex functions as a coactivator for GATA-1 in erythropoiesis via subunit Med1/TRAP220 (Stumpf et al. 2006)
►► *****Notify Dr. Ray of the phenotype, gene, and organism that you will use for your final presentation.*****
26 **Development and applications of CRISPR-Cas9 for genome engineering (Hsu et al. 2014)**
Mar 4 **Genome-scale CRISPR-Cas9 Knockout screening in human cells (Shalem et al. 2014)**
11 Sporopollenin biosynthetic enzymes interact and constitute a metabolon localized to the endoplasmic reticulum of tapetum cells (Lallemand et al. 2013).
►► *****Provide Dr. Ray with PDFs of two key papers that will be used for your final presentation.*****
18 Super-resolution imaging of fluorescently labeled, endogenous RNA Pol II in living cells with CRISPR/Cas9-mediated gene editing (Cho et al. 2016)
►► 19 Last day to withdraw from classes with a "W"
►► **23-27 Spring Break**
April 1 Chromatin remodeling during glucorticoid receptor regulated transactivation (Sections 1.1 to 2.1 only; King et al. 2012).
8 CRISPR-based chromatin remodeling of the endogenous Oct4 or Sox2 locus enables reprogramming to pluripotency (Liu et al. 2018)
15 Long noncoding RNAs: past present, and future (Kung et al. 2013)
22 In-class preview of draft presentations – break up into teams of two students, review your presentations, and provide constructive comments to each other.
29 In-class review of final presentations and abstracts – break up into teams of two students, review abstracts and final presentations, and provide constructive comments to each other.
May 6 Begin final presentations from 3 students (bring presentation on USB drive). ALL students must attend.
13 Continue final presentations (Skeen W139, 3:30-5:30pm; bring presentation on a USB drive). All students must attend.

NOTE: Articles in bold provide a demonstration of the general type of information that you want to consider incorporating into your presentation (i.e., gene knockout, yeast 2-hybrid, co-immunoprecipitation, etc.).

IMPORTANT: ***All students will use the in-class PC computer & projector for the final presentation, so bring your presentation on a USB drive.*** *For students using Apple computers, be sure to check your presentation on the class computer/projector on April 29 to make sure that it will display properly (i.e. compatibility issues sometimes arise with Mac presentations). As a backup, email your presentation to yourself in case your USB drive file gets corrupted.*

Presentation Abstract: Students are encouraged to utilize the NMSU writing center (https://towc.nmsu.edu/), or contact Dr. Ray to get assistance with writing your abstract. I recommend that you pattern your abstract so that it is similar to those associated with the papers that we cover in class. However, do not simply cut and paste information from the papers that you use for your presentation. You must use your own words and summarize the key points of your specific presentation.

Students with disabilities: Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act (ADAAA) covers issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact: Trudy Luken, Student Accessibility Services (SAS) - Corbett Center, Rm. 208. Phone: (575) 646-6840.
E-mail: sas@nmsu.edu. Website: https://sas.nmsu.edu/.

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