ANIMAL SCIENCE 8415
Survey in Epigenetics

Spring Semester 2014
MWF - 2pm (classroom - S146)

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Office Hours: After class or by appointment

Requirements: 1) Instructor consent and 2) Previous course in Biochemistry or Molecular Biology.

1. Course Description:

This course will introduce graduate students to the various areas of epigenetics and the research concerning epigenetics in eukaryotes (with special emphasis on mammals). The course is designed to be a combination of lectures, paper discussions, and research talks by invited faculty speakers working in epigenetics.

*Topics covered during class include:*
  - Techniques
  - Chromatin (Euchromatin/Heterochromatin)
  - Histone Proteins and Histone Post-Translational Modifications
  - DNA Methylation/Hydroxymethylation/Demethylation
  - Polycomb/Trithorax Group Proteins
  - noncoding RNAs (siRNA, miRNA, piRNA, lncRNA, lincRNA)
  - Genomic Imprinting
  - Dosage Compensation (X-chromosome inactivation)

2. Textbook:

A recommended (not required) textbook for the class is *Epigenetics* (by C. David Allis, Thomas Jenuwein, Danny Reinberg, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York, First Edition, 2007; ISBN-13: 978-0-87969-724-2). I have several copies in my office that you can borrow for periods of 24 hrs. I expect these books to be treated with much care. Please **DO NOT** mark the books in any way. I also have several other books which deal with epigenetics as part of my personal library. You
may use them but I request that you do not keep them for more than a few hours since I will be using them to prepare for class.

3. Course Policies:

The grading scale will be as follows:

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Grade</th>
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<tr>
<td>500</td>
<td></td>
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<tr>
<td>86% &amp; above</td>
<td>A</td>
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<tr>
<td>70% to &lt; 86%</td>
<td>B</td>
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<tr>
<td>60% to &lt; 70%</td>
<td>C</td>
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<tr>
<td>&lt; 60%</td>
<td>F</td>
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I. Exams. There will be 2 exams (100 points each). You will have as much time as needed to complete the exams.

**** Individual meetings to discuss the experiment with Dr. Rivera must take place no later than three days prior each exam ****

Exam Format

40 points – Short answers and definitions

You will be allowed to bring a 5x8 index card containing hand-written reference material. This will be turned in together with the exam.

60 points – Experiment

I will grade according to your level and background. I will be fair but I expect you to push yourself out of your comfort zone. No reference material may be included in the card for this part of the exam.

For this part of the exam you will write about an experiment that you would do in your own thesis to ask about how your model might be affected by your treatment/s at the epigenetic level (using the material covered in class). This does not have to be in your own field but I think that asking about your own model (your thesis project) might simplify matters. These are your ideas and I will respect them as such. No one but me will see your proposed studies/ideas. *****Students currently working in the field of epigenetics MAY NOT use their own research project or anyone’s in their lab for their exam.

a) Introduction 10 points – ~5 sentences. (some ideas = What is known? Why is it important that you do this experiment? What is not known for your system/model? What will your results add to your field? etc.).

b) Hypothesis and Objective 5 points – One sentence each. State the hypothesis/es and the objective/s of the study.

c) Materials and Methods 20 points – what are you going to do? (some ideas = what is your model? Treatments? What will you use as baseline (control) to see if your treatment had an effect? What techniques are you going use to test your hypothesis? Why are you using the techniques that you chose for your experiments? How are you going to visualize your results (by what method)?
d) Results **20 points** – **at least** two figures (gels, tables, bar graphs, blots, heat maps, etc.). You will bring the figures to the exam but the figure legend will have to be written during the exam time. Think about what would your results look like if you were to actually do your experiments (remember - results are **not always** positive – what you do during your actual studies is to test the null hypothesis - the experiments you do either reject the null hypothesis or fail to reject the null hypothesis in favor of the alternative hypothesis.

e) Future studies **5 points** – ~3 sentences. (some ideas = given what you observed in your results – what would the next logical question/hypothesis be?)

II. Research proposal (200 points – group grade) – This portion of the grade will be in the form of homework and an oral presentation. Late homework will be docked 10% for each late day (e.g. - 1 point off/day for the Hypothesis). Please refer to the 1) Research Proposal Evaluation sheet and 2) NIH grant writing guidelines.

**Hypothesis – 6 points**

**Summary (≤ 30 lines) – 30 points** (see information below)
1) Dr. Rivera - 10 points
2) Comments to peers summaries - 10 points (individual grade)
3) Judges’ comments – 10 points

Instructions for Summary: No longer than 30 lines of text. Briefly state the specific aims and research design. Provide information about how your project will address the gap in knowledge. State hypothesis. Address the significance to human health.

**Project narrative:** - **4 points**. Describe the relevance to public health. No more than three sentences.

**Written proposal – 80 points.** Please proof read (spelling/grammar) your proposal carefully.

- ≤ 5 pages total (not including references or title page) - FOLLOW THE NIH GUIDELINES – AIMS and RESEARCH STRATEGY
- Use EndNote for citations – style PLoS.
- Single space
- 12 point - Arial
- 1” margin
- First page - title (no more than 81 characters) and authors
- Number sequentially (first page not included)
- PIs name – on the heading of each page

**Oral presentation – 80 points** - group grade

****The oral presentation will be judged by a panel of Faculty. I refrain from grading the oral presentation and use the average score of the judges for grading.****

**Do not plagiarize**
I will do a plagiarism check – any written proposal showing more than 10% overall content match will be deducted 50% of the written proposal’s final grade. Any proposal with 1% - 9% overall content match will undergo a deduction of 1 point/% from the written proposal’s final grade.
III. **Class participation/paper discussions (100 possible points).** The 100 points will be divided in 50 points for class participation (including participation during guest speaker presentations) and 50 points for the paper discussions. For each discussion, the papers (a review and an original research article) will be handed out at least 2 weeks in advance.

IV. **There will be no final exam**

V. **Absences** - I will not keep attendance. Missed lectures will be the student's responsibility. If the student must miss a paper discussion because of official University business (e.g. scientific meeting) the student will have to write a one page summary for each paper due no later than the date and time of the discussion. **Advance notice and documentation** to corroborate the needed absence from the paper discussion will be expected. In the event that the student misses a paper discussion due to sickness the student must contact Dr. Rivera prior to missing the discussion to arrange a way in which to make up the missed participation points. Students will be expected to attend all guest lectures.

VI. **Academic Dishonesty:**

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

VII. **Americans With Disabilities Act:**

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please register with the Office of Disability Services (http://disabilityservices.missouri.edu), S5 Memorial Union, 573-882-4696, and then notify me of your eligibility for reasonable accommodations. For
other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.

**VIII. Intellectual Pluralism:**

The University community welcomes intellectual diversity and respects student rights. Students who have questions concerning the quality of instruction in this class may address concerns to either the Departmental Chair or Divisional leader or Director of the Office of Students Rights and Responsibilities (http://osrr.missouri.edu/). All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.
Group__________________________________________

Epigenetics - AnSci 8415
Judge’s Evaluation Sheet - Research Proposal

Instructions

FOLLOW THE NIH GUIDELINES – AIMS and RESEARCH STRATEGY (see information at the end of this document)

WRITTEN PROPOSAL
5 page limit (including all text and figures) - no less than 0.5” margins - 12 point font (Times New Roman). Single spaced.

Aims – 1 page
Research Strategy – 4 pages
References – no page limit

Research Proposal Evaluation

Written portion (120 points)

• Hypothesis - (6 points) __________
• Summary – (30 points) – 500 words not including title
  • Dr. Rivera (10 points) ___________
  • Peer comments (10 points) ________
  • Judges’ comments – How well did the summary explain the proposal? - (10 points)
  _______
• Project Narrative – (4 points) ____________
• Background and Significance /Research Design and Methods - (80 points)

How well was the project written? Did it conform to the specifications of page limit, line spacing, and font?

Were the instructions followed/were all the points in the instructions included?

How well was the idea(s) thought?

How well was the problem stated?

Was the background sufficient to understand the significance of the problem?

Is the project focused on finding epigenetic causes for the stated problem/s?

Was relevance to health included and explained?
Are the assays used appropriate and sufficient to answer the hypothesis?

Were the potential difficulties addressed?

Were the specific aim and long-term objective of the proposal clear and in agreement?

Was the literature cited?

Is the proposal written/presented in a way that is understood by the expert and non-expert reviewer?

**Oral Presentation (80 points)**

- Background and significance (30 points) ________________
  
  Comments:

- Research design and methods (30 points) ____________

  Comments:

- Participation of all members of the group (5 points) _________

- Answer to questions (8 points)
  How well prepared were the presenters to answer questions? Did all members participate in answering the questions?

- Power Point presentation (5 points) ____________

- Time - (2 points) - 25 minutes (20 minute presentation + 5 minute questions) _________
5.5.2 Specific Aims

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

The Specific Aims attachment is required unless otherwise specified in the FOA. Specific Aims are limited to one page.

5.5.3 Research Strategy

Organize the Research Strategy in the specified order and using the instructions provided below. Start each section with the appropriate section heading—Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section.

Follow the page limits for the Research Strategy in the Table of Page Limits, unless specified otherwise in the FOA.

(a) Significance

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

(b) Innovation

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or intervention(s) to be developed or used, and any advantage over existing methodologies, instrumentation or intervention(s).
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation or interventions.

(c) Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Unless addressed separately in the Resource Sharing Plan, include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised. A full discussion on the use of Select Agents should appear in 5.5.11 below.
- If research on Human Embryonic Stem Cells (hESCs) is proposed but an approved cell line from the NIH hESC Registry cannot be identified, provide a strong justification for why an appropriate cell line cannot be chosen from the Registry at this time.