Instructors
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The basic principles of genetics have been elucidated largely by studies using a small number of species: from the peas used by Mendel to more recent examples such as the zebrafish. In this course we will investigate many of these key species that have become model organisms, including the yeast, Saccharomyces cerevisiae, the nematode, Caenorhabditis elegans, the fruit fly, Drosophila melanogaster, and the mouse, Mus musculus. Why were these species chosen to study genetics? What important findings in genetics have these studies yielded? How do you ‘do’ genetics in these model systems? How can experiments with these species help us to understand the basis of human genetic disease? These questions will be addressed by presentations from experts in the field and by discussions of classic and current literature.

This course is open to all graduate students at the University of Pittsburgh. It is assumed that students participating in the class have taken an introductory genetics class at undergraduate level (e.g. BIOSC 0350 here at Pitt).

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<th>Subject</th>
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<td>Aug 28 Introduction to Genetics and Drosophila as a Genetic Model Organism</td>
<td>DLC</td>
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<td>Sept 4 Drosophila genetic screens – ectopic eyes – Tribute to Walter Gehring</td>
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<td>Sept 11 Drosophila genetics – More eyes – Ras signaling pathway Enhancer and Suppressor screens</td>
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<td>Sept 18 Drosophila genetic screen for cancer Mouse as a genetic model system</td>
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<td>Oct 9 Mouse genomic imprinting</td>
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<td>Oct 16 Mouse genomic imprinting Genomic Editing – ZFNs, TALENs, CRISPR-Cas9</td>
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<td>Oct 30 Genomic Editing – Paper Discussion Yeast Genetics</td>
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<td>Nov 5 11 am – Introduction to C. elegans as a Model System</td>
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<td>Nov 6 Yeast Genetics</td>
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<td>Nov 13** RNAi: discovery, function and its use as a genetic tool in C. elegans – Paper Discussion (Phil Sharp lecture begins at 11 am (Langley 219B)</td>
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**Class to be held in Langley 219A, beginning at 9 am
Coursework and Grades

Participation: 40%
Students must play an active part in the course by reading the set papers in advance and contributing to the discussion during class.

Homework: 30%
Each instructor will set a short assignment for specific classes. For most paper discussion days, a Figure facts template will be assigned for each paper. These are due by midnight on the Wednesday before the paper discussion class. Students should upload their filled in templates to the Course web site under Assignments.

Final Presentation: 30%
Toward the end of the semester, each student will choose a paper that uses one of the discussed organisms to model a human disease*. Each student will give a 30 minute (roughly) oral presentation to the class with 5-10 additional minutes for questions. This final presentation should include introductory material, focus should be given to the human disease and how this model organism is a great system to study this disease. The presenter will then lead the discussion of the research article for the entire group (i.e. this is what the instructors did for the first set of papers – now you get to do it!). The presenter will prepare a Powerpoint presentation including all of the figures from the paper, assuring that the figures are of decent resolution. As the presenter, you will not be able to go through each figure in detail in the time allotted; you will need to focus on the most important parts of each figure. Each student is expected to have read the papers and contribute to the discussion. Although the group as a whole will discuss future directions for the research (coming to class prepared with ideas – or ready to shoot down the ideas that the authors may have included in their discussion), the presenter should include his/her own ideas at the end of the presentation. These should not be a reiteration of the authors’ discussion.

*Make every effort to select papers unrelated to research in the department. Papers should be selected from the last 2-3 years. Once you have a paper or papers in mind, please send them to us so that we can approve them. dlc7@pitt.edu and jeffh@pitt.edu.

Short oral presentations: Each student will give one short introductory presentation as part of the faculty-lead discussions of the assigned research papers. These presentations are short, 10-minute introductions to one or two of the assigned papers. The presenter will be responsible for preparing slides and presenting relevant background information for the paper. This should include knowledge about the topic at the time the paper was published, the goals of the paper, the hypothesis being tested, and may include a brief introduction to a new or interesting technique used. Students will volunteer for (or be assigned to) specific papers on the first day of class.

Students with Disabilities
If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 216 William Pitt Union, 412-648-7890/412-383-7355 (FTY), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course.

Academic Integrity Policy on cheating/plagiarism
Academic Integrity Policy: Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, noted below, will be required to
participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz, exam or paper will be imposed.

**E-mail Communication Policy**
Each student is issued a University e-mail address *(username@pitt.edu)* upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to [http://accounts.pitt.edu/logintoyouraccount.click](http://accounts.pitt.edu/logintoyouraccount.click) on Edit Forwarding Addresses, and follow the instructions on the page. Be sure to log out of your account when you have finished.
Review Papers for August 28th

Introduction to Genetics of Model Organisms:


Drosophila as a Genetic Model Organism:


Review Papers for Drosophila genetics – September 4-18th


Papers for Discussion

Tribute to Walter Gehring and understanding master regulatory genes – September 4th


Genetic dissection of the Ras pathway – September 11th


Genetic screen for cancer – September 18th

Background papers:

For class:
September 25th


October 2nd
Reviews:


papers for class:
October 9th:


October 16th:
Genomic Editing – ZFNs, TALENs, CRISPR-Cas9
Debbie Chapman

**Review Papers for October 16th**


**Papers for Discussion October 23rd**


**Papers for Discussion October 30th**

Christine Cucinotta
Yeast as a Model System

Reviews (To be discussed Oct. 30 - Nov. 6):
1) Budding Yeast for Budding Geneticists: A Primer on the Saccharomyces cerevisiae Model System, Duina, Miller, and Keeney 2014
2) The art and design of genetic screens: yeast, Forsburg 2001
3) Yeast: Experimental Organism for 21st Century Biology, Botstein and Fink 2011

Articles:
4) (To be discussed Oct. 30) Healing for destruction: tRNA intron degradation in yeast is a two-step cytoplasmic process catalyzed by tRNA ligase Rlg1 and 5’-to-3’ exonuclease Xrn1, Wu and Hopper, 2014
5) (To be discussed Nov. 6) From structure to systems: high-resolution, quantitative genetic analysis of RNA polymerase II. Braberg et al. 2013.

Read the first four articles and be prepared to discuss them in class on October 30th.
The 5th paper is for discussion on November 6th.
Introduction to C. elegans as a Model System
RNAi: discovery, function and its use as a genetic tool in C. elegans
Lew Jacobson

Review paper for November 5th

RNAi and C. elegans as a model system **if you read only one review article, the Lehmann et al. (2012) paper is probably the most relevant.


Papers for Discussion – November 13th


Supplemental Data for Gally et al. can be found at:
http://dev.biologists.org/content/136/18/3109/suppl/DC1