Syllabus: Principles of Genetics (BIOL 260, 4 credits) Spring 2014

Prerequisites: BIOL F115X; BIOL F116X; CHEM F105X; MATH F107X or higher

Lectures: MWF 1:00-2:00 pm Murie Auditorium

Labs: Murie 306
Mon 6:00-9:00 pm (F01: 37351), TA is Lisa Stephens
Tue 8:15-11:15 am (F02: 37352), TA is Ludda Ludwig
Tue 2:00-5:00 pm (F03: 37353), TA is Ludda Ludwig
Tue 6:00-9:00 pm (F04: 37354), TA is Lisa Stephens
(Evolution has the lab Wed and Thurs 2-5)

Final Exam: 1-3 pm Wed May 7, 2014 Murie Auditorium

Instructor: Diana Wolf, email: dewolf@alaska.edu
Office hours: Mon, Wed, Fri 2-3 pm (after class), and by appointment.
Office: 240 West Ridge Research Building (WRRB) 474-5538
Please feel free to contact me by phone, email, or in my office if you need help with course material.

Teaching assistants (TAs):
Annalisa (Lisa) Stephens, email: astephens@alaska.edu
Office: WRRB 214, phone: 474-1175; email is preferred mode of contact
Office hours: Thurs 1-2 pm and by appointment

Sarah (Ludda) Ludwig, email: ludda.ludwig@gmail.com
Office: Trailer T9, phone: 474-6777
Office hours: Wed 12-1 in Murie 301 and by appointment

Course readings/materials:
ISBN-13 9781429292931
Note: the looseleaf version is cheaper and comes with access to online resources that you will need. If you buy a different version of the book (such as hardback), you can buy a separate access code to the website.
This textbook is available on reserve in the BioSciences library in the Arctic Health Building, and as an ebook via Goldmine on the UAF Library’s website.
Supplementary readings are required and will be provided as appropriate.

Clickers: Turning technologies Response Card RF (sold at UAF bookstore- same as that used for Intro Biology and Chemistry). You should register your clicker ID on blackboard by as soon as possible.

Blackboard: http://classes.uaf.edu/
The Blackboard website contains lab and lecture handouts, homework assignments, and practice tests. Course materials will be updated daily, so you should check regularly. If you miss class, this is the place to go.

Course description: Principles of inheritance; physiochemical properties of genetic systems. Course covers Mendelian genetics, molecular genetics, quantitative genetics, population genetics, and molecular evolution.

Course goals and learning outcomes: Why do you look like your family? Why aren’t you identical to
your family? How do we find genes in the genome? How do we determine what those genes do? Students will learn the fundamentals of Mendelian and molecular genetics, as well as how these topics are important in everyday life; topics such as genetic diseases, stem cells, forensics and genetically-modified organisms (GMOs). Additionally, students will gain experience with critical thinking, problem solving, writing and will gain hands on practice in modern laboratory skills.

**Instructional methods:** Students will learn through lecture, hands-on laboratory activities, homework, computer simulations, small group discussion, and by writing research reports and giving a short presentation.

**Course policies:** You are expected to attend all lectures and your appropriate lab period, to arrive on time, and to participate in all laboratory activities including discussions and computer simulations. You are also expected to read the assigned textbook chapters and supplemental reading materials. This is a difficult class, with many details to master. You will not be able to master these concepts without reading your textbook. **If you miss class, please check blackboard for the powerpoint lecture, handouts, readings and homework, and review them.** Homework will be assigned weekly and is due in blackboard. **There will be periodic quizzes during lectures, most delivered by clickers. You MAY NOT make up missed clicker quizzes,** however, for excused absences I can exclude that quiz from your grade (it doesn’t count towards your average). If you cannot attend your regular lab section, you should attend one of the other lab sections the same week. Contact both your regular TA and the TA of the lab you will attend prior to your regularly scheduled lab and the lab you will attend to request permission.

**Unless specifically stated in the assignment, all papers, quizzes and exams should be performed by you, by yourself.** Please, no cheating on exams or quizzes. You are in school to learn, and I hope that you want to learn. If you resort to cheating, you won't study as hard, and you won't learn as much, so you will be cheating yourself of an education. If you are involved in cheating or plagiarism, you will receive an F in the course, and will be referred to the Associate Dean of Students & Director of Judicial Services for disciplinary action.

If you are re-taking this class, please come see me in my office so we can discuss whether you need to redo the lab and how to make sure you can succeed in this class.

You must take exams at the scheduled time and place. **Points will be deducted from late assignments at a rate of up to 10% per day.**

**Disagreements about grading:**
If you disagree with the way something has been graded, please submit your explanation in writing, along with the graded work. If a simple mistake was made in tallying points or scoring, this can be easily corrected. If you have been told that the correct answer is different from your answer, but you believe your answer to be correct, you must submit an explanation that includes references to the textbook, class handouts and/or the scientific literature.

**Support Services:**
If you require more assistance than can be provided in class, lab and meetings with the course instructor/TAs, you may want to contact Student Support Services (http://www.uaf.edu/ssspp). They provide free services to eligible students, including: tutoring, math help, academic advising, mentoring and personal support, and cultural and social engagement. You may be eligible if you have a limited income, a documented physical or learning disability, or are a first generation college student (meaning that neither of your parents earned a Bachelor’s degree)
Disabilities Services:
If you have a disability, or think you may have a disability, please contact the Office of Disabilities Services (203 WHIT, 474-7043). We will work with this office to provide reasonable and appropriate accommodation to students with disabilities.

Evaluation:
Student performance will be evaluated through 5 exams, weekly homework assignments and quizzes, several papers, one short presentation, laboratory reports and lab participation. Grade cutoffs are A:90%, B:80%, C:70%, D:60%, F:<60%.

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<thead>
<tr>
<th>Exam</th>
<th>Grade</th>
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<tr>
<td>Exam 1</td>
<td>17.5%</td>
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<tr>
<td>Exam 2</td>
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<tr>
<td>Exam 3</td>
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<tr>
<td>Final Exam</td>
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<td>Homework (due each Thursday at 10pm on Blackboard)</td>
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<td>and Quizzes (during lecture, no makeup quizzes)</td>
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<tr>
<td>Lab (lab handouts, presentations, papers, quizzes)</td>
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Tentative Schedule:
Do not rely on this schedule. Timing of topic coverage is subject to change and will be updated on blackboard. Exam dates will not change.

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<thead>
<tr>
<th>Lecture</th>
<th>Reading</th>
<th>Lab</th>
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<tbody>
<tr>
<td>Jan 17 Introduction, pre-assessment</td>
<td>Ch 1</td>
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<td>Jan 20 Civil Rights Day, no class</td>
<td>Hartl and Jones, Chapter 1</td>
<td>No lab this week</td>
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<tr>
<td>Jan 22 DNA, transcription, translation (basic overview)</td>
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<td>Deadline for fee payment, adding classes</td>
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<td>Jan 24 DNA, transcription, translation (more detail), intron splicing, biochemical pathway</td>
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<td>Jan 27 Chromosomes and cellular reproduction (cell cycle, meiosis, mitosis)</td>
<td>Ch 2</td>
<td>Playdoh meiosis, mitosis, DNA replication, transcription, translation,</td>
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<td>Jan 29 monohybrid crosses, types of dominance, penetrance and expressivity, lethal alleles</td>
<td>Ch 3, p.43-56</td>
<td>Genetic Disease introduction</td>
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<td>Jan 31 Quiz on meiosis, mitosis, DNA, transcription, translation</td>
<td>Ch 5, p.99-104</td>
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<td>Feb 3 Quiz on previous lecture</td>
<td>Ch 4, p.73-88</td>
<td>Computer Flies 1 (1-locus, sex-linked, lethal), Live fly mutations</td>
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<td>Feb 5 Quiz on dosage compensation</td>
<td>Ch 3, p.61-63</td>
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<tr>
<td>Feb 7 Gene interactions, epistasis</td>
<td>Ch 5, p.106-113</td>
<td>Computer Flies 2 (2 loci, epistasis), DNA extraction – banana</td>
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<td>Feb 10 Cytoplasmic, anticipation, environment</td>
<td>Ch 5, p.117-8, 122-124</td>
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<td>Feb 12 Quiz on previous lecture</td>
<td>Ch 6</td>
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Pedigrees
Feb 14 Review/catchup
Feb 17 **Exam 1**
Feb 19 Linkage, Recombination Ch 7, p.161-169 DNA extraction from plants, Discuss Steets paper, Genetic disease talks
Feb 21 Linkage, Recombination Ch 7, p.170-175 Computer Flies 3 (linkage), PCR, PCR paper activity
Feb 24 Polymerase chain reaction, Finding genes for traits p.523-5 Computer Flies 3 (linkage), PCR, PCR paper activity
Feb 26 Mapping Ch 7, p.176-186
Feb 28 Mapping Ch 7, p.176-186
Mar 3 Physical mapping, electrophoresis Ch 7, p.187-191 Computer Flies 4 (mapping), physical mapping activity, Gel, exosap
Mar 5 Chromosome structure, centromeres, telomeres Ch 11, p.291-301
Mar 7 Transposable elements Ch 11, p.301-315 DNA sequencing, sequencing activity, Discuss Karakaainen paper
Mar 10 Transposable elements, DNA sequencing Ch 11, p.301-315, p.534-537
Mar 12 Review/catchup
Mar 14 **Exam 2**
Mar 17 **Mar 17-21 No classes, Spring Break**
Mar 24 Chromosome Variation Ch9, p.258-262 DNA sequence analysis
Mar 26 Chromosome Variation (delete?) Ch 9, p.239-252
Mar 28 Polyploidy Ch 9, p.252-262
Mar 31 Quantitative Genetics Ch 24
Apr. 2 Quantitative Genetics (delete?) Ch 24
Apr. 4 Quantitative Genetics (delete?) Ch 24
Apr. 7 Bioinformatics (prep for lab)
Apr. 9 QTLs
Apr. 11 GWAS, hapmap, 23 and me DNA sequence analysis
Apr. 14 Review/catchup
Apr. 16 **Exam 3**
Apr. 18 Shotgun, nextgen sequencing
Apr. 21 Trees
Apr. 23 Human history
Apr. 25 **No classes, Spring Fest**
Apr. 28 Epigenetics
Apr. 30 Epigenetics, class evaluations
May 2 New material review
May 5 Cumulative Review
May 7 1:00-3:00 pm Murie Auditorium **Final Exam** (cumulative)