

Biology 142Q – Advanced Topics in Genetics and Molecular Biology

Spring 2018

10A –

MWF 10:45-11:50 AM
OSB 101

Lab:

Tuesday
1:40-4:40 PM,
OSB 317



Course Description and Objectives:

We will examine the genetic and molecular **mechanisms** that influence multiple aspects of biological life. Physical and chemical **properties** of genes, transmission mechanisms, and **processes** by which genes are manifested as physical characteristics in a **whole organism** will be covered in detail. How genes are **expressed** (turned on), the causes and effects of **mutations**, will also be explored.

The laboratory is designed as a **research setting** including a semester-long project using molecular biology to examine biodiversity in the environment. An emphasis will be placed on recognizing **social, ethical, and environmental impacts** of current advances in genetic research. **Critical thinking** and **scientific communication skills**, including writing and oral presentation, will be developed throughout the semester.

Required Purchases:

Textbook. *Genetics – A Conceptual Approach*. **FIFTH** Edition. By Benjamin A. Pierce. 2012. W. H. Freeman and Company.

Laboratory Research Notebook. This notebook must be purchased from the Oxford College bookstore. No substitutes will be accepted.

Laboratory Manual. The custom laboratory manual for this course will be available for purchase in the laboratory.

Highly Recommended:

Solving Problems: *Solutions and Problem-Solving Manual to accompany Genetics – A Conceptual Approach*. Fourth Edition.

Writing in Biology: *A Student Handbook for Writing in Biology*, Karen Knisely, 2013, 4th edition, W.H. Freeman and Co. Very useful for writing assignments.

Instructor: Sarah Fankhauser

Office: OSB 302

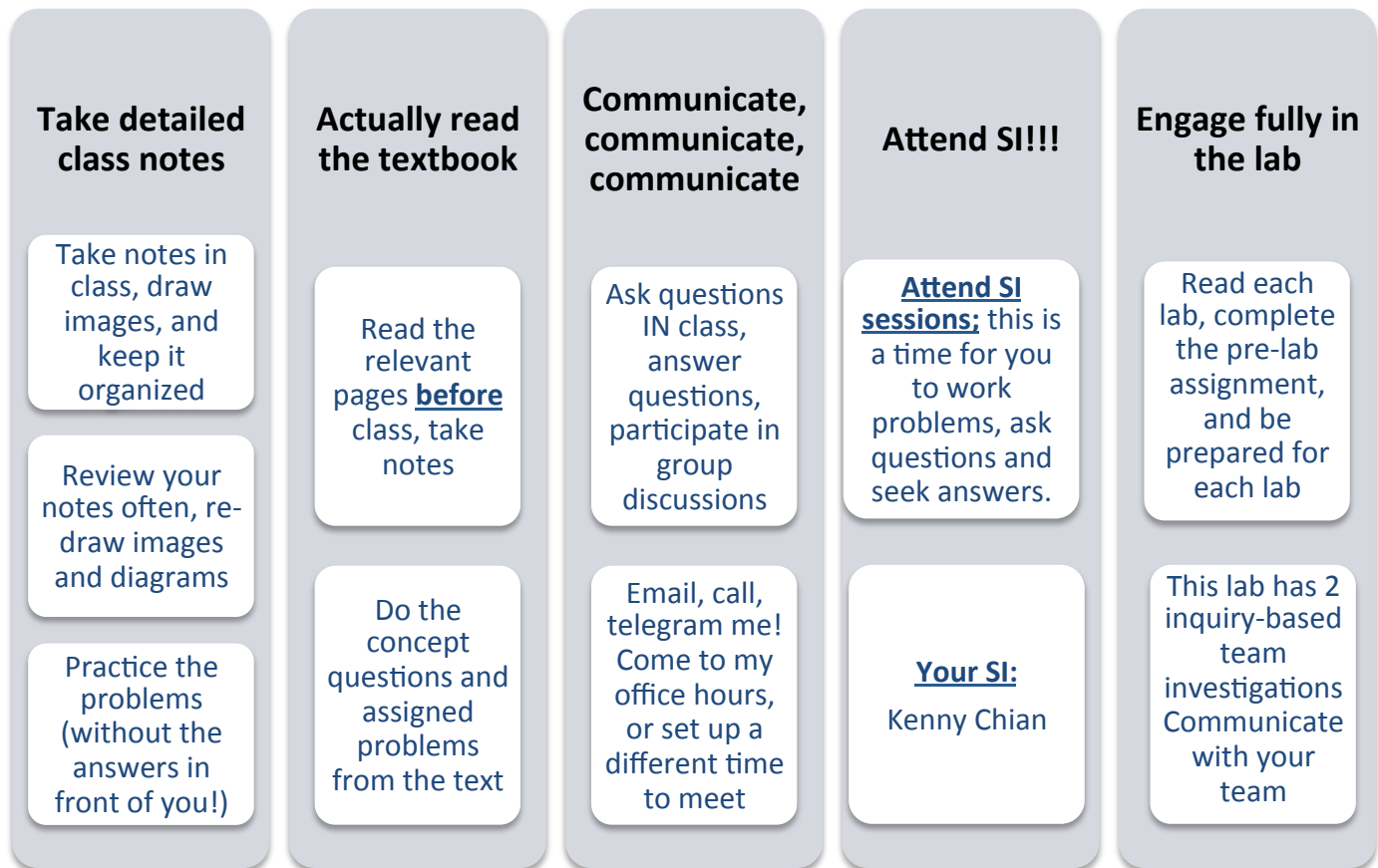
Email: Sarah.Fankhauser@emory.edu

Office Hours: Friday 9:30am or by appointment

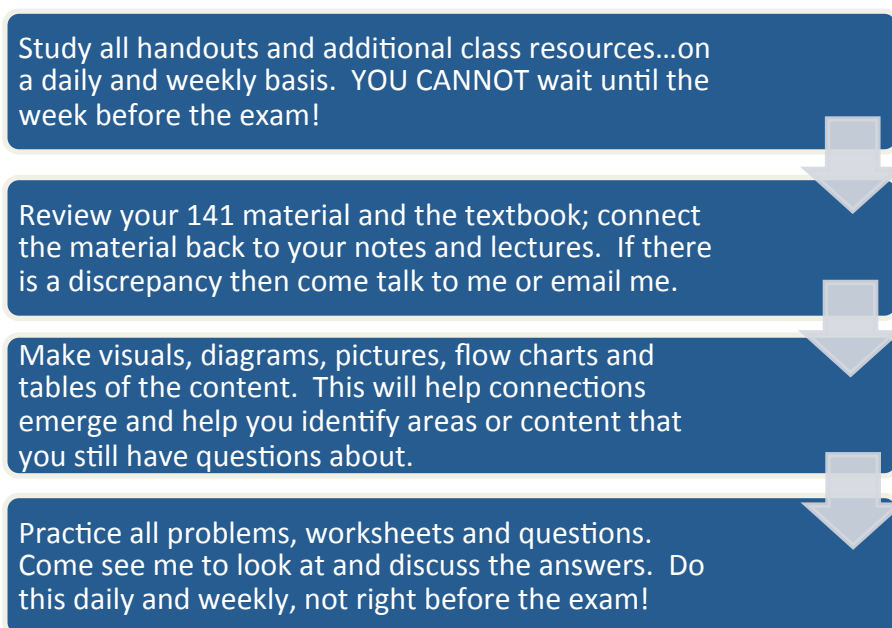
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Tips for Success:



How to study (yes you need a diagram for this)



What Ways of Inquiry really means:

You will learn about genetics in this course not just by learning information simply “given” to you. You will learn about the subject by practicing methods that led to the discovery of that knowledge in the first place - by asking questions, designing experiments, reading and writing critically, working independently, making connections, and thinking beyond the confines of the discipline.

Policies, requirements, etc...

Honor Code: All examinations and all work for credit in this course come under the regulations of the Honor Code. Your signature on your work attests to your upholding the Honor Code. Please read the information on **plagiarism** on the Library web page and always ask if you have any questions about assignments. Note that writing assignments will be submitted to **SafeAssign on Canvas**. Please follow the Honor Code in ALL aspects of this course and include your signature on your work as your pledge.

Quizzes: There will be several quizzes either in-class or take-home during the course of the semester. The quizzes will test some important concepts you may have covered in your preparation for class or from your prior knowledge.

Exam Protocols: Do not come to any exam with notecards in your pockets or on your person. All cell phones are to be turned off and either in your bag in the front of the room or on the instructor's bench. Do not write notes or study material, or anything that could be construed as these, on your body. Check for such notations and remove before the exam time. These are considered to be a breach of the Honor Code.

Primary Research Articles: There are scheduled discussion days on current primary research articles for this course (*see syllabus*). A scientific journal article will be distributed for reading prior to each discussion day. Each student is required to read the paper and participate in a critical evaluation of the paper.

Class Participation: This is an interactive course. Points are assigned for participation. These points are assigned based on your overall engagement in the classroom throughout the semester (asking and answering questions in class, problem solving abilities, level of preparation, displaying your interest by contributing news articles in genetics).

Absences: The policy on absences is provided in a separate handout. Unexcused absences, tardiness, or a failure to follow the procedures outlined in that handout can result in a reduction in your grade. It is your responsibility to clearly communicate with the instructor as much in advance as possible about medical or family emergencies.

Cell Phones: The use of cell phones is strictly prohibited in the classroom and the laboratory. Please turn off your phone before you come to class and leave your phone at the front during exams.

Photography with camera phones is only permitted to gather evidence for your research project.

Personal Computer or Tablet: If you would like to take notes on your personal laptop or tablet in class you must first seek special permission from the instructor. Surfing the web, Facebook, Skype or other multitasking/networking/chat during class is completely unacceptable and will not be tolerated.

Accommodations: In order to receive consideration for reasonable accommodations, please contact the OAS and complete the registration process. If you have a registered accommodation, please immediately coordinate a meeting with me to discuss a protocol to implement accommodations that will (or may) be needed over the course of the semester. This meeting should occur as early in the term as possible. Contact Megan Bohinc in OAS for more information at (770) 784-4690 or oas_oxford@emory.edu

Inclusivity: Oxford College of Emory University's ideals of inclusivity require that we foster an environment where people of diverse backgrounds, identities, abilities, and ideologies are affirmed, respected, and seen as a source of strength; where we strive to learn together, and ultimately thrive communally. If we at all fail to support these ideals, then we encourage discussion towards improvement, and we hope that this statement affirms your right to seek those discussions via dialogue with faculty, staff, your peers, and the use of the "Speak Up!" system when needed.

College-Wide Assessment: Student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.

NOTE: This syllabus, particularly the schedule, is subject to change. You will be notified of any changes in the classroom and/or via Canvas. It is your responsibility to note the changes.

Biology 142 – Advanced Topics in Genetics and Molecular Biology
Lecture Schedule Spring 2018

Date		Topic	Assigned Reading
W	Jan 17	Introduction: The big picture	Ch. 1
F	Jan 19	DNA: The Secret of Life	Ch. 1; Ch. 10
		<i>Film response due on canvas by 5PM Monday Jan 22</i>	
M	Jan 22	The history of genetics and DNA	Ch.1; Ch. 10
W	Jan 24	DNA structure and technology	Ch. 10; Ch. 19: p. 535-541; 546-548; 556-560
F	Jan 26	DNA structure and technology	same as above
		<i>Take home Quiz 1 due in class</i>	
M	Jan 29	Chromosomes and cell division	Ch. 2
W	Jan 31	Transmission genetics - overview	Ch. 3
		<i>D1S80 draft Materials and Methods due in class and on Canvas</i>	
F	Feb 2	Sex determination and sex linkage	Ch. 4
M	Feb 5	Lab 3 Part 1	Complete pre-lab assignment
		<i>D1S80 draft Introduction due on Canvas</i>	
W	Feb 7	Human pedigree analysis	Ch. 6: p. 139-147; 150-157
		<i>Draft Group proposal due on Canvas by 5pm</i>	
F	Feb 9	Human pedigree analysis	Ch. 6: p.139-147; 150-157
M	Feb 12	Complexity of genetics and molecular basis	Ch. 5: p. 103-117; 119-121
Tues	Feb 13	EXAM I 8:00 - 9:30 a.m. (Chs. 1-4, 6, 10 and 19)	
W	Feb 14	Complexity of genetics and molecular basis	Ch. 5: p.103-117; 119-121
F	Feb 16	Linkage and recombination	Ch. 7: p. 165-190
		<i>Revised group research proposal due on canvas by 5pm</i>	
M	Feb 19	<i>D1S80 draft Results Figures and Discussion Outline due in class and on Canvas</i>	
W	Feb 21	Mapping and three-point crosses	Ch. 7: same as above
F	Feb 23	Genetics of bacteria	Ch. 9: p. 241-251; 254-260
		<i>Lab notebook check 1 (Labs 1-4) due in class</i>	
M	Feb 26	DNA Replication	Ch. 12: p. 325-346
		<i>D1S80 Final Abstract, Results and Discussion due in class and on Canvas</i>	
W	Feb 28	DNA Replication	Ch. 12: p. 325-346
F	Mar 1	DNA Replication Review	Ch. 12: p.325-346
		<i>Take home Quiz 2 due in class</i>	

Biology 142 – Lecture Schedule Spring 2018 Continued

Date	Topic	Assigned Reading
M Mar 5	Transcription Introduction	Ch. 13
Tues Mar 6	EXAM II – 8:00 – 9:30 a.m. (Chs. 5, 7, 9, 12)	
W Mar 7	Gene expression: Transcription	Ch. 13
F Mar 9	Gene expression: Transcription & RNA Processing	Ch. 13, 14
	Mar 12-16 SPRING BREAK	
M Mar 19	Gene expression: RNA processing	Ch. 14
W Mar 21	Gene expression: Translation	Ch. 15
F Mar 23	<i>Primary research article discussion</i>	
M Mar 26	Gene expression: Translation	Ch. 15
W Mar 28	Principles of gene regulation	Ch. 16: p. 443-458
	<i>Materials and Methods draft due in class</i>	
F Mar 30	Regulation in prokaryotes	Ch. 16: same as above
M Apr 2	Eukaryotic genome organization	Ch. 17; Ch. 11 p. 304-305
	<i>Lab notebook check 2 (Labs 5-8) due at the end of lab</i>	
W Apr 4 405	Regulation in eukaryotes	Ch. 17; Ch. 14 p. 393-396; 402-405
	<i>Take home Quiz 3 due in class</i>	
F Apr 6 405	Regulation in eukaryotes	Ch. 17; Ch. 14 p. 393-396; 402-405
M Apr 9	Review and problem solving	
Tues Apr 10	EXAM III - 8:00 – 9:30 a.m. (Chs. 13-17)	
W Apr 11	Point Mutations	Ch. 18
F Apr 13	Large Mutations	Ch. 18; Ch. 8 – some highlights
M Apr 16	<i>Primary research article discussion</i>	
W Apr 18	Cell cycle regulation	Ch. 23
F Apr 20	DNA: Curing Cancer film	
	<i>Results figures and tables draft due on Canvas</i>	
M Apr 23	Cancer and cell cycle regulation	Ch. 23
W Apr 25	Cancer and cell cycle regulation	Ch. 23
F Apr 27	Problem solving and applied topics	Ch. 23
	<i>Film response due on canvas by 5PM</i>	
M Apr 30	Back to the big picture	
	<i>Final Paper due on Canvas Monday April 30th by midnight</i>	
	<i>Lab notebooks (Labs 9-11) due Tuesday May 1st by noon</i>	

FINAL EXAM: Wed May 2nd 9am-12pm

Biology 142 – Advanced Topics in Genetics and Molecular Biology

Laboratory Schedule Spring 2018

Room 317

Date	Topic
Jan 23	D1S80 VNTR Investigation I Human DNA Extraction and PCR
Jan 30	D1S80 VNTR Investigation II Human Genotype Analysis
Feb 6	Microbes and Granite Outcrops Literature Search for Research Project

Note: Part 1 of this lab will be in class on Feb 5

Feb 13	Sample Collection – Arabia Mountain
Feb 20	Identification of unique colony types and PCR Colony abundance estimations (open lab Feb 23- March 2nd)
Feb 27	Antibiotic plate preparation and secondary PCR Colony abundance estimations (open lab Feb 23- March 2nd)
Mar 6	Purification of PCR products, antibiotic resistance measurement
Mar 13	No lab – Spring break
Mar 20	MspI digest and Bioinformatics Part I
Mar 27	RFLP analysis and Bioinformatics Part II
Apr 3	Sequence Analysis of Outcrop Microbes
Apr 10	Preparation for Research Symposium
Apr 17	Preparation for research paper and Research Symposium
Apr 24	Research Symposium

Distribution of Evaluation Points:

Lecture:

Lecture exams (3)	300 points
3 Quizzes	30 points
Class participation	10 points
2 Film responses	10 points
2 Article discussions	20 points
Final exam	170 points

Laboratory:

Human genotyping drafts (3)	15 points
Final abstract, results, discussion	15 points
Group proposal and literature review	10 points
3 Lab notebook checks	40 points
Paper drafts	20 points
Symposium presentation	25 points
Full-length scientific paper	100 points

Final grade determination: *Your final grade in the course is determined by the percentage of total points that you earn at the end of the course.*

(Plus and minus grades are given on the final grade)

A: 90 - 100%; B: 80 – 89%; C: 70 – 79%; D: 60 – 69%; F <60%