

## Biology 335 Genome Biology [M] – 3 credits Fall 2016

**Time and Location:** Aug 23 - Dec 12  
Tuesday and Thursday 10:35-11:50 am  
CUE 318

**Prerequisites:** Genetics, Biology 301

**Instructor:** Prof. Joanna Kelley  
Heald 431A  
Office hours: Tuesday 9:00-10:00 am  
joanna.l.kelley@wsu.edu; 5-0037

**Text:** “Genomes” by T.A. Brown, available at <http://www.ncbi.nlm.nih.gov/books/NBK21128/?depth=2> and selected current articles on genome biology, which will be posted on course website  
Additional supplementary materials on hold at Owen Library, including:  
"Introduction to Genomics" by Arthur M. Lesk, 2<sup>nd</sup> edition

**Course Website:** You can access the syllabus, assignment directions, and pdfs of current article on genome biology on course page (learn.wsu.edu).

**Overview:** Biology 335 is an advanced course focused on genomes and genome analysis. This course will cover a range of topics in genome biology. Students will engage in projects exploring genome structure and function. Topics will include DNA sequencing technologies, genome structure, comparative genomics, functional genomics, personal genomics, genome-wide association studies, and population variation. Comparative analysis of genomes from bacteria to humans will include methods for sequencing, genotyping, annotation of genomes, population genetics and evolution.

**Student Learning Outcomes:**

1. Develop critical and scientific thinking skills to analyze and solve problems.
2. Synthesize information regarding key features of genome structure.
3. Understand and explain major biological concepts in evolution, ecology and organismal biology as it relates to genomes.
4. Use scientific literacy and knowledge of genomes to communicate to the scientific community.
5. Critically read popular press articles in genomics.

Student Learning Outcomes:	Assignments that advance outcome:	Evaluation of Outcome:
Develop critical and scientific thinking skills to analyze and solve problems	All discussions Evaluate scientific and popular media	Participation in discussions, written assignments
Synthesize information regarding key features of genome structure.	All topics	Midterm exams Final exam
Understand and explain major biological concepts in evolution, ecology and organismal biology as it relates to genomes sciences.	Participation in discussions and in oral presentation, written assignments and exams	Homework assignments
Use scientific literacy and knowledge of genomes to communicate to the scientific community.	Participation in discussions and in oral presentation, written assignments and exams	Written assignments Presentation

**Class Mechanics** (how it all works): Class attendance is *required*. This is an active classroom where participation, interaction and exploration are expected. All assigned work in this class is *required*: all homework, all quizzes and midterms, all presentations. A *short assignment* will be given in class regularly, always *unannounced*. *On homework* you are *encouraged to work together*, almost anything is allowed, but you may not directly copy. Unless we are specifically working on something in class, no laptops will be allowed.

**Grading:** Grades are based on homework assignments, oral report and exams as shown below. Working with genomic data in your homework assignments and term paper exploring a specific topic in genome biology are important to your grade and understanding of the material.

Homework assignments (5 X 15 pts each)	75
First midterm exam	50
Second midterm exam	50
Written assignment 1	40
Written assignment 2	60
Written assignment 3 (30 draft / 70 final)	100
In-class assignments / Participation (4 / day)	max 110
Final exam	55
Final Presentation	<u>60</u>
Grand total	<u>600</u>

**Grading Scale: %**

A	90 +	C	70-73.99
A-	87-89.99	C-	67-69.99
B+	84-86.99	D+	64-66.99
B	80-83.99	D	60-63.99
B-	77-79.99	F	60 and below
C+	74-76.99		

**Exams:** Short answer, essay and problem solving.

**Assignments:** Detailed directions for homework will be posted on course website. I encourage you to work together on homework assignments, however the actual writing must be your own. Late assignments will not be accepted. Reading is to be done before the day it is listed on the syllabus.

**Weekly schedule:** Subject to change based on the flow of the course.

Week	Date	Topic	Reading	Assignments due
1	Aug 23	Introduction		
	Aug 25	Genetics Review		
2	Aug 30	Introduction to Genomics	Brown Ch 1, 3	
	Sep 1	Sequencing Technologies	Brown Ch 6	Homework #1
3	Sep 6	Assembly – Mapping Genomes	Brown Ch 5	
	Sep 8	Assembly – Using new technologies		
4	Sep 13	Annotation	Brown Ch 7	Homework #2
	Sep 15	Comparative Genomics	Papers	Written assignment #1
5	Sep 20	Comparative Genomics	Papers	
	Sep 22	<b>Midterm 1</b>		
6	Sep 27	Evolution	Brown Ch 14	
	Sep 29	Evolution	Brown Ch 15	Homework #3
7	Oct 4	Prokaryotic genomes	Brown Ch 2	Written assignment #2
	Oct 6	Eukaryotic genomes	Papers	
8	Oct 11	Ancestry	Papers	

	Oct 13	Domestication	Papers	
9	Oct 18	Gene expression	Brown Ch 10	Homework #4
	Oct 20	RNAseq	Papers	
10	Oct 25	Tasmanian Devil Genomics	Papers	
	Oct 27	Genomics Core Tour	Papers	
11	Nov 1	Chromatin / Splicing	Brown Ch 8	
	Nov 3	Epigenetics	Papers	Homework #5
12	Nov 8	Proteomics	Brown Ch 11	
	Nov 10	Systems Biology	Papers	Draft written assignment #3
13	Nov 15	Systems Biology	Papers	
	Nov 17	<b>Midterm 2</b>		
14	Nov 22	THANKSGIVING		
	Nov 24	THANKSGIVING		
15	Nov 29	Class presentations		
	Dec 1	Class presentations		
16	Dec 6	Class presentations		
	Dec 8	Class presentations		Final written assignment #3
	Dec 14	Final Exam		10:10AM - 12:10PM

### Written Assignments:

All written assignment will have the opportunity for revision based on feedback from the instructor. For the first two assignments, a draft for revision must be submit at least one week before the due date.

#### Written assignment 1:

*Task:* Write a formal summary of a popular press article (what was the article about). The summary should be one paragraph.

*Goal:* Make sure you understand what you are reading, practice consolidating information into a short summary.

*Evaluation criteria:* I will be evaluating on whether you stay true to the text, text is properly attributed, stays within the stipulated size.

#### Written assignment 2:

*Task:* Write an analysis of a popular press article. Did the article fairly represent the science as we understand it? If so, why? If not, why not? Does the article sufficiently describe the science one needs to read the article? What is the science one needs to understand to read the article? The analysis should be 2 pages with 2 sections.

*Goal:* Make sure you can critically read and evaluate popular press articles.

*Evaluation criteria:* Draw on primary literature and popular press article to provide evidence for assertions. I will be looking for whether or not you have used evidence from 2 sources main source cited by the popular press article and one outside of that. How well have you supported your assertion with evidence?

### Written assignment 3:

*Task:* Write your own popular press article based on primary literature. Your role is scientific journalist, writing to readers of National Geographic. You will create an article with appropriate formatting and graphics. You will have embedded visuals. You must use at least 2 primary literature sources. Before formatting it should be approximately 4 pages.

*Goal:* Summarize scientific findings to a non-scientific audience.

*Evaluation criteria:* Rubric levels: great, okay and poor. At least 2 primary literature sources, no jargon, clear descriptions of technical processes, an image that supports their argument. References should be cited in the format of a recognized scientific journal. You should plan to introduce the topic by putting it in a larger context within the field of genomics and address the following questions (among others): What is the history of the question being addressed? What approaches are being used to address it? What are the future prospects for research in this field?

**Oral and Written Report:** Because genome biology is an exciting and fast moving field, students will pick a current scientific article in genomics to write the popular press article. At the end of the semester you will also give a 15-minute presentation plus a few minutes for questions based on your final written assignment. Students will give and receive peer evaluations as well as feedback from the instructor.

Your writing will be graded on the following criteria.

	Poor	Excellent
Introductory Paragraph	No introductory paragraph goes straight to the topic	Good introduction that puts the topic in a larger context with description of the topic and the essay focus in a clear and concise form
Provides balance or covers different aspects of the topic	Express similar viewpoints or use similar approaches by the author	Landmark articles on topic with different research methodologies or approaches with different views on the topic
Proper evaluation of the articles	Superficial evaluation that does not consider methodology, analysis or basis for conclusions	Critical evaluation that uses additional articles and provide supporting evidence for conclusion <i>or</i> alternative analysis for a different conclusion
Conclusion or Summary paragraph	Conclusion superficial or loosely related to the main discussion and topic	Conclusion well developed and coherent
Writing and mechanics	Unclear writing grammatical/spelling errors, poor organization, Inadequate citation	Language clear, errors minimal, organization clear/effective, proper citation

### Revision policy

Instructor feedback will be provided on all written assignments. Students will have the opportunity to revise both of the written assignments. Revised assignments are due on the date indicated on the syllabus.

### Oral Presentation Assignment and Grading Rubric

You will each give a short oral presentation (10 minutes) on a current topic in genetics. There will be approximately four presentations on each of the class presentation days. Please choose a topic that you feel will be of broad interest to the class. I can work with you regarding possible topics and formats for your presentation (e.g., short Powerpoint, overheads, oral plus writing on board or overhead, etc.). **The final exam will include material from the oral presentations.** Your oral presentation will be graded on the following criteria. This can also serve as a guide in planning your presentation.

	Poor	Excellent
Introduction	Inadequate and leaves audience confused about topic.	Clear, interesting, explains why topic is important and what will be discussed.
Organization	Jumped between topics, lacked periodic summaries	Easy to follow, with smooth transitions and periodic summaries
Delivery	Presentation was read or seemed memorized. Speech was too slow, fast, or soft. Eye contact with audience lacking.	Speech smooth, articulate and easy to hear. Eye contact appropriate. Delivery comfortable and well-prepared.
Media and Resources	Materials confusing, distracting or served as filler. Too much information per slide or overhead.	Materials clear and with pertinent information. Not too much information per slide or overhead.
Conclusions/ Response to Questions	No or unclear conclusions presented. Misunderstands or give confusing answers to questions.	The main point(s) of the presentation are briefly summarized. Answers questions well or, if unable to do so, acknowledges lack of information.

**Attendance Policy:** Make-up quizzes and exams will be allowed for excused absences. Make up quizzes and exams will not be allowed for unexcused absences.

**Disabilities:** Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building, Room 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Center.

#### **Academic integrity:**

Academic integrity will be enforced in this course. I encourage you to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Students who violate WSU's Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office of Student Conduct. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions: Read more:  
<http://apps.leg.wa.gov/wac/default.aspx?cite=504-26-010>

**Campus Safety and Emergencies.** Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors to the Pullman campus. As part of this commitment, the university has prepared a Campus Safety Plan that can be found at <http://safetyplan.wsu.edu/>, and contains a listing of university policies, procedures, statistics and information relating to campus safety, emergency management and the health and welfare of the campus community. Campus emergency and travel alerts can be found at <http://alert.wsu.edu/>. Please register your contact and emergency information at your <http://my.wsu.edu/> website. Further information on emergencies can be found at <http://oem.wsu.edu/emergencies>.

**IMPORTANT:** Per new WSU policy effective August 24, 2015, I will ONLY be able to respond to emails sent from your WSU email address. I will NOT be able to respond to emails sent from your personal email address as of the first day of fall semester.