



## Bio 11.07: Major Events in the History of Life & The Human Genome

Instructor: Prof. Kevin J. Peterson, 321 LSC

Meeting time: 9L (MWF 8:50-9:55; X hour Thursday 9:05-9:55 AM).

Virtual office Hours:

M: 12:30 PM-2:30 PM

W: 12:30 PM-2:30 PM

Th: 12:30 PM -2:30 PM (quiz weeks until ~5:00 PM)

F: 12:30 PM - 2:30 PM (quiz weeks until 4:45 PM)

### COURSE DESCRIPTION

Over the course of the last 4.5 billion years, Life has faced a number of challenges, and in response has evolved a number of remarkable innovations. These innovations are written in DNA, and thus molecular fossils for many of the major events in the history of life can be found within our very own genomes. This course will survey the human genome, and each week we will take one gene and pursue the contextual geologic and genetic fossil records of this gene to explore a major theme in Biology, whether Evolution, Information, Speciation, Communication, or Extinction.

### SCHEDULE

I. "Evolution: *18S rDNA* and the Genealogy of Life" (9/13-9/17)

Xhr (9/16): Cladistics and phylogenetic trees.

II. "Information: *RPS3* and Molecular Fossils of an Ancient RNA World" (9/20-9/24, 9/27)

Xhr (9/23): Northern Analyses.

III. "Individualization: *ERVW-1 (Syncytin-2)* and The Origin of Cells, Selfish Genes, and Higher Selectable Units" (9/29-10/01)

Xhr (9/30): Review for First Quiz on Event I (Evolution)

9/30: First Quiz on Event 1. Due to me by Friday 10/01 5 PM EST.

IV. "Metabolism: *SOD1*, Photosynthesis, the Rise of Atmospheric Oxygen, and the Origin of Eukaryotes" (10/04-10/08)

Xhr (10/07): Review for Second Quiz on Event II (Information) and Event III (Individualization)

10/07: Second Quiz on Events 2 & 3. Due to me by Friday 10/08 by 5 PM EST.

V. "Reproduction: *BRCA2*, Mitosis, and the (Convergent?) Evolution of DNA" (10/11-10/15)

Xhr (10/14): Review Session for Midterm

**TAKE HOME MIDTERM EXAMINATION AVAILABLE Thursday October 14<sup>th</sup> OVER EVENTS I-IV. EXAM IS DUE Thursday October 21 by 9:05 AM EST.**

VI. "Speciation: *SOX3*, and the Origins of Sex, Sexual Selection, and Sexual-Somatic Conflict" (10/18-10/22)

Xhr (10/21): Southern analyses.

VII. "Interaction: *HOXB6* and the Cambrian Explosion of Life" (10/25-10/29)

Xhr (10/28): Gene trees.

VIII. "Regulation: *DLX5*, the Origin of Limbs, and the Terrestrialization of Planet Earth" (10/29-11/03)

Xhr (11/04): Review for Third Quiz on Events V (Reproduction), VI (Speciation) & VII (Interaction)

11/04: Third Quiz on Events 5-7. Due to me by Friday 11/05 by 5:00 PM EST.

IX. "Communication: *FOXP2* and the Rise of Humans and Human Language" (11/05-11/10)

Xhr (11/11): Continue Lecture

X. "Extinction: *BNC2* and the Genomic Legacies of Extinct Lineages" (11/10-11/15)

Xhr (11/16 - note that this is on Tuesday!): Continue Lecture

Review Session for Final Wednesday 11/17 8:50 AM

**TAKE HOME FINAL EXAMINATION OVER EVENTS V-X AVAILABLE Wednesday November 17<sup>th</sup> DUE Wednesday Nov 24<sup>th</sup> by 12:00 PM EST.**

## **COURSE INFORMATION**

### **Text Book**

There is no required textbook. Instead, readings for each week are posted on Canvas, as are the weekly PowerPoint presentations. Nonetheless, feel free to purchase any text book that you like or have easy access to – going over certain topics (e.g., protein synthesis, mitosis etc.) will certainly help you better understand the topic, but it should not be necessary in order to understand the intent of or the material presented within the lecture. At the end of this syllabus I also provide a recommended list of books organized by each weekly topic for you to peruse at your leisure.

### **Grading**

Assessment in this course is divided into exams and quizzes. First, there are two examinations, each worth 35% of your final grade. Both exams are open-note open-reading take home examination. Although open note, this exam is not to be done in collaboration with any other student(s), and you are not allowed to discuss the exam in any manner with any other student (past or present). Please note that late exams will be assessed a 25% penalty. During both exams access to Canvas is allowed, but you are prohibited for searching for items of information on the internet (this is actually for your own benefit!).

Second, there are three quizzes each worth 10% of your grade. These too are take home, open note, open reading with access to Canvas allowed. Again, you are not allowed to discuss the quiz in any manner with any other student (past or present), nor search the internet for any information. Each quiz covers slightly more material than the preceding quiz (see the syllabus for details).

Homework is not graded, but instead is intended to help you with the subject matter, especially as it relates to specific biological techniques relevant to that's week's lecture/material. Feel free to work with friends, dorm buddies etc. on the homework. Also, I have written quizzes for each of the events on Quizlet - the URL is: <https://quizlet.com/join/5EJXT3QXz?i=31t7xc&x=1rqt>. Again, these are not graded but simply an opportunity for you to test your knowledge of the terms and simple concepts from the class.

If you have any questions at any time please ask!

## **Weekly Schedule**

Each week we will have lecture on WMF during the "9L" slot. During the X-hr on Thursday at 9:05 AM we will either lecture over information required for your homework, review for a quiz or an examination, or use the time to finish lecture material. On Monday, Wednesday, Thursday and Friday from 12:30-2:30 PM I will hold office hours over Zoom (at least for now - I'm hoping to hold at least the MWF sessions in person soon). I will also hold extra office hours on Thursday afternoons during quiz weeks.

Each week's materials (for example, the powerpoint, homework, readings etc) will be made available by Sunday of that week at the latest. If there are any problems with any of the files PLEASE EMAIL ME. Sometimes things look fine on my end but don't on yours and the only way for me to know that there is a problem is for you to let me know.

All lectures and X-hours will be recorded and a link provided on the Canvas home page under "Panopto Video." Office hours will not be recorded.

If you wish to take part in religious observance(s) that occur during this academic term that conflict with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

## **Student Needs**

Students with disabilities enrolled in this course and who may need disability-related classroom accommodations are encouraged to make an appointment to see me before the end of the second week of the term. All discussions will remain confidential, although the Student Accessibility Services office may be consulted to discuss appropriate implementation of any accommodation requested. I recognize that the academic environment at Dartmouth is challenging, that our terms are intensive, and that classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including: your undergraduate dean, Counseling and Human Development, and the Student Wellness Center. Please do not hesitate to utilize these resources, and if there is anything I can do as well, come speak with me at your convenience.

The only financial commitment to this course is access to a personal computer, and if you ever are having computer problems, or the means to acquire a computer, please let me know right away.

## **Study Groups**

Study Groups offer enrolled students the opportunity to engage, in a group environment, with former students who have taken this course and done well. Study Groups meet once per week for 2 hours to review questions/concerns about material currently being studied. This format also allows students to develop a deeper understanding/wider perspective of the course material by engaging with others and hearing questions about the material that they, themselves, might not have considered. Study groups will be held on Sunday 2-4 PM, 6-8 PM and 8-10 PM, and Monday 7-9 PM. You can sign up for one of these time periods and I will post a sign-up sheet the first week of the term. If you have an unexpected conflict you may go to another study group, but I ask you do not make a habit of it so that students are distributed uniformly amongst the four study group sessions. There is no charge to join a study group, and you are not required to join one either.

## **Honor Principle**

Please review Dartmouth's Honor Principle (<http://www.dartmouth.edu/judicialaffairs/honor/index.html>). I take this principle seriously and have full faith that you do and will as well. I have strict instructions about what is versus what is not allowed with the quizzes and examinations. I will discuss these rules, and their rationale, in class. If you ever have any questions about the Honor Principle and my expectations please email me or stop by so we can discuss in person.

## **Bio11 Spaces**

It is important for me to emphasize that ALL Bio11 spaces, whether the classroom, study group rooms, group study sessions, virtual Zoom meetings, or my office, respects all people including race, ethnicity, gender expression, gender identity, sexual orientation, socio-economic background, age, religion, body shape, size, and ability. Violations of this policy will not be tolerated.

## **COVID protocols (text from the College)**

### Attendance:

You are expected to attend class in person unless you have made alternative arrangements due to illness, medical reasons, or the need to isolate due to COVID-19. For the health and safety of our class community, please: **do not attend class when you are sick**, nor when you have been instructed by Student Health Services to stay home. All lectures are recorded so you will not miss any information by staying home and watching the posted video.

### Safety:

In accordance with current College policy, all members of the Dartmouth community are required to wear a suitable face covering when indoors, regardless of vaccination status. This includes our classroom and other course-related locations, such as labs, studios, and office hours. If you need to take a quick drink during class, please dip your mask briefly for each sip. Eating is never permitted in the classroom. (The only exception to the mask requirement is for students with an approved disability-related accommodation; see below.) If you do not have an accommodation and refuse to comply with masking or other safety protocols, I am obligated to assure that the Covid health and safety standards are followed, and you will be asked to leave the classroom. You remain subject to course attendance policies, and dismissal from class will result in an unexcused absence. If you refuse to comply with masking or other safety protocols, and to ensure the health and safety of our community, I am obligated to report you to the Dean's office for disciplinary action under Dartmouth's Standards of Conduct. Additional COVID-19 protocols may emerge. Pay attention to emails from the senior administrators at the College.

### Accommodations:

Students requesting disability-related accommodations and services for this course are required to register with Student Accessibility Services and to request that an accommodation email be sent to me in advance of the need for an accommodation. Then, students should schedule a follow-up meeting with me to determine relevant details such as what role SAS or its Testing Center may play in accommodation implementation. This process works best for everyone when completed as early in the quarter as possible. If students have questions about whether they are eligible for accommodations or have concerns about the implementation of their accommodations, they should contact the SAS office. All inquiries and discussions will remain confidential.