

# Principles of Evolution— Spring 2026

BIOL 4500 Section 001 – 3 Credits

Utah Valley University

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## Instructor Information

Dr. Carl E Hjelmen (he/him)

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## **Office hours:**

Tuesdays 11:30am-12:30pm and Wednesdays 1:30pm-2:30pm or by appointment

## Course Prerequisites:

BIOL 3500 Genetics

## Resources:

### **Text:**

Evolution 3<sup>rd</sup> Edition

Bergstrom and Dugatkin

We will be discussing a number of papers and classic literature. These required readings will be posted in PDF format on Canvas. I can always make further reading recommendations if you ask

## **Course website:**

Canvas. Additional helpful resources are also available on <https://cehjelmen.github.io>

You can access these sites from any computer linked to the internet.

**Access to Canvas will be critical as assignments, grades, updates, and other announcements will be posted there.**

## **Computation:**

While much of this class will rely on paying attention to lecture and participation in discussion and activities, some work requires use of a computer with internet access. I highly suggest that you bring your own laptop to class. **Please let me know if this is not possible.**

## Course Information:

### **Description**

“Nothing in biology makes sense except in the light of evolution”—Theodosius Dobzhansky

Evolutionary biology seeks to make sense of the miraculous diversity that exists within and among organisms on the planet. The concepts within this field of biology help us make sense of disease, viruses, ecology, and variation as a whole. This course will provide students with a broad conceptual foundation and capstone for life science courses they have taken or will take.

**Course Objectives:**

- Discuss classic literature and historical figures on the subject of evolutionary biology.
- Explain the molecular and genetic basis for evolution.
- Explain the mechanisms of evolution (natural selection, migration, genetic drift, mutation, and nonrandom mating) and their relationship to genetics of populations and sources of variability.
- Apply Hardy-Weinberg calculations to various populations.
- Describe the mechanisms of speciation and origin of new species.
- Evaluate how the fossil record relates to current views of evolution.
- Analyze evolutionary trends demonstrated by phylogeny.
- Investigate the course of evolution in prokaryotes and eukaryotes, with an emphasis on hominin evolution.
- Compose a variety of disciplinary-appropriate texts; for example, scientific essays evaluating various evolutionary topics, scientific posters, scientific manuscripts, mock grant proposals, etc.

**Course Expectations:****Student Responsibilities**

Everyone (students and instructor) should treat others with mutual respect and patience. I encourage students to work together to solve problems, unless otherwise explicitly stated. I recognize students come from their own unique background and have had their own unique experiences. If you need any special accommodations or assistance, please do not hesitate to contact me with questions.

**How to do well in this course:**

How well you do will be directly related to the effort you put into it. Below are suggestions:

1. Regular attendance - You will benefit from class discussion and activities. Furthermore, the class needs your participation to establish a group dynamic that provides encouragement and support.
2. Be prepared - Please do assigned readings and assignments on time. If you are interested, I can always provide additional reading materials.
3. Listening and Speaking - We will practice being generous and respectful listeners. Know that the class will benefit from what you have to contribute. Please, no side conversations.
4. Additional Information - Keep up with the work--it's not intended to be difficult, but you can't stir up your thinking without a commitment to taking the class seriously. You will be required to do additional informal assessments and exercises. Many of these exercises will be in-class work; if you have sustained absences, you will have difficulty passing the course.
5. Making your needs known - Please let me know what your needs are throughout the term. I am happy to work with you to improve your experience in this course when possible.
6. Writing – Assignments **must be typed** unless otherwise specified. Well-written English and good spelling are expected; I will deduct points for excessive spelling and/or grammar errors on any assignment.
7. Distractions – Unless told otherwise, put away all electronic devices during class.
8. Success may take time outside of class - Mastery isn't immediate. Part of success is spending as much time studying that is necessary for you. This amount will vary from student to student. If you need tips or help, please contact me.

**Course Procedures:**

I have provided a preliminary schedule that we will follow, it includes the sequence of topics, reading materials, assignments, etc., however, keep in mind that this schedule is subject to change. You are responsible for all announcements made in class or online, and adjustments to schedule (even if you are not there). If you miss a class or come late after announcements have been made, you are responsible to find out from another student what announcements were made and what material was covered.

**Lecture Notes:**

Lecture notes or a power point presentation will typically be posted before lecture when possible. These notes will not cover everything said in lecture, but they should prove a useful addition to your notes for understanding and reviewing the concepts.

**Professor Responsibilities**

It will be my goal in this course to be prepared, organized, and provide a safe, productive environment to learn. Students can be expected to be treated fairly, and with respect. Additionally, all assignments will be graded and returned in a timely manner.

I will be available outside of class time to help any students who ask for it during student hours. If for any reason you cannot meet with me during the pre-determined times, you are welcome to contact me to discuss arranging an additional meeting time. You are always welcome to come by my office, but unless it is arranged in advance, I cannot guarantee I will be available.

The best method to reach me is through e-mail, however, please be patient and recognize that you may not always receive an immediate response. I will do my best to respond in a timely manner within reasonable hours, but e-mails sent late at night will not be responded to until the next day.

**Disclaimer - Communication and Syllabus Changes**

All items in this syllabus are subject to change or modification to correct errors or accommodate extenuating circumstances. You are responsible for messages sent by me and other UVU officials to your UVU email address. If you do not regularly use this address, please forward your UVU email to the address you regularly use. Please check the email for important class announcements and updates.

**Disclaimer – Artificial Intelligence and use of tools like ChatGPT**

Artificial intelligence (AI) is becoming an ever-prevalent tool in society and it is important to understand how this tool works. It is important to recognize this as a “tool” and not a “crutch”. AI is prone to “hallucinating” and giving incorrect or false results; it also does not allow me to gauge your understanding of material. I encourage use of all resources for your work but ask that you make it your own and that you do not ask AI to complete your assignments for you. If you utilize AI, be sure to indicate it in your response that you used AI and indicate how you corrected the response and made it your own. If I feel you are not adequately responding or that you are relying on AI too much, I reserve the right to remove points on responses, up to zero credit.

**Assessment:**

Your final grade will be determined by the following formula (to be determined):

<u>Area</u>	<u>% of grade</u>
Exams	30 (15% each)
Discussion précis	10
Leading Discussion	10
Assignments	25
Project	25
Total	100

- The class will **not** be graded on a curve
- Your final grade will be calculated on a percentage basis

<u>Cutoff</u>	<u>Grade</u>	<u>Cutoff</u>	<u>Grade</u>
93%	A	73%	C
90%	A-	70%	C-
87%	B+	67%	D+
83%	B	63%	D
80%	B-	60%	D-
77%	C+	<59.5%	E

**Assignments and Project Descriptions***Discussion “précis” (10%)*

A précis is a short summary of a text or speech. Each week in which we have a discussion over a paper you will be required to submit a précis that accompanies the text. These are required by the beginning of class to ensure everyone reads the material. A précis includes information such as the question being asked, identification of the hypothesis, a summary of the findings, and at least one question you have about the material. Specific rubrics and descriptions can be found on Canvas.

*Leading Discussion (10%)*

Many weeks, we will spend Fridays discussing a relevant and/or historical from the primary literature (peer reviewed work). Students must sign up to lead (or co-lead) a discussion. Students may utilize slide shows, the white board, etc., but must be prepared to lead the class in the discussion.

*Assignments (25%)*

In some of the sections, we will focus on the application of skills and utilization of tools. Handouts will accompany these activities and must be turned in on Canvas for assessment and feedback. Other sections will have short essays and papers to write up. Rubrics will accompany written assignments.

*Exams (30%)*

There will be two take home exams throughout the semester (see dates on schedule) and make up 30% of your final grade (15% each). These exams will be “take-home” exams and may include some basic recall of information from lectures, but will focus primarily on interpretations, critical thinking, and thoughtful discussion over open-ended questions.

*Final Project (25%)*

While we will cover a lot of material in this course, we may not cover an organism or evolutionary topic that is of most interest to you. In order to enrich the material we learn in lectures, students will

construct their own review of an organism/evolutionary topic. This project will be scaffolded throughout the semester, with: 1) selection of topic, 2) Outline and Annotated Bibliography, 3) Meeting with Dr. Hjelmen, 4) peer review, 5) in class review of posters. More details and a rubric to follow.

Students will present their posters in the final week of class.

**Late work:**

I will keep the window for submitting assignments open, but they will accrue a 10% grade deduction daily.

I understand that life can be chaotic and there are many things outside of your control. If you are unable to complete an assignment for any reason by the due date, please let me know and we can work something out! Remember to always let Dr. Hjelmen know if you're going to be late!

**Cheating and plagiarism:**

I encourage students to work together to solve problems, unless otherwise explicitly stated. This does not mean copying answers. I do not tolerate cheating of any kind, including copying from another student on exams or assignments. I will impose one of several penalties for cheating that range from a warning up to assigning a failing grade for the course. Please ask me if you are not sure about what constitutes plagiarism. See above statement about use of AI. If AI is used without modification, I consider this cheating.

**UVU Policies and Resources**

[Policies and Success Strategies \(Links to an external site.\)](#)

[Accessibility Services \(Links to an external site.\)](#)

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU [Accessibility Services](#) at [accessibilityservices@uvu.edu](mailto:accessibilityservices@uvu.edu) or 801-863-8747. Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at [DHHservices@uvu.edu](mailto:DHHservices@uvu.edu) DHH is located on the Orem Campus in BA 112.

**Academic Integrity**

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work. Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their [rights and responsibilities](#). In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in [UVU Policy 541: Student Code of Conduct](#).

### **Equity and Title IX**

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

### **Religious Accommodations**

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at [accessibilityservices@uvu.edu](mailto:accessibilityservices@uvu.edu). If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a [specially dedicated space](#) for meditation, prayer, reflection, or other forms of religious expression.

### **Campus Resources (Links to an external site.)**

#### **Technology Support Services**

For 24/7 technical support contact [Instructure's Canvas Support Live Chat \(Links to an external site.\)](#) (385) 204-4930 (Available 24/7)

#### **Student Care Statement**

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to visit <https://www.uvu.edu/studentcare/> for access to a variety of resources. You may also email [care@uvu.edu](mailto:care@uvu.edu) for assistance.

All of us have a need to maintain mental health and benefit from the assistance of professionals to do so. UVU offers mental health services at very low cost (some are free). While there may be a wait list for individual counseling, group counseling may be available in some circumstances. Student Health Services is located in SC 221, telephone 801-863-8876 <https://www.uvu.edu/studenthealth/psych/>. The following community resources are available 24/7- the National Suicide Prevention Lifeline 1-800-273-8255 and the Safe UT Crisis Chat & Tip Line <https://safeut.med.utah.edu/>. You may also access the Crisis Text Line 741-741 or call 9-1-1. If an emergency is happening on campus, call campus police 801-863-5555.

**Tentative Course Schedule**

Here is a (tentative) schedule for topics. It is your responsibility to make up any work that you might miss if absent. All readings and assignments can be found on Canvas.

Wk	Dates	Topics	Readings	Due Dates
1	Jan. 5 Jan. 7 Jan. 9	Intro & Syllabus How to read a paper pt. 1 <b>Science as a way of knowing (Recording)</b>	For Class — Ch. 1	<b>Discussion Date Signup by Jan 9</b>  <i>Questions about scientific papers Due Jan 7</i> <b>Syllabus quiz due Friday Jan 9</b>
2	12-Jan Jan. 14 Jan. 16	<b>What is Evolution (video recording), no in person class</b>  <b>Darwin history (no class)</b>  How to read a paper pt. 2	For Class: — Ch. 2	<i>Darwin Video questions—Jan 16</i> Sel. Discussion Days--January 12
3	Jan. 19 Jan. 21 Jan. 23	<b>MLK Jr. Day—NO CLASS</b>  Relevance of Mendel/Others  <b>Discussion: Pre-Darwin ideas:</b>	For Class — Ch. 6  For Discussion: — Malik 2017	<b><i>Sel. of Project -Jan. 23</i></b>  <b><i>Precis-Jan. 23</i></b>
4	Jan. 26 Jan. 28 Jan. 30	Mendel Cont.  <b>Modern Synthesis (recording)</b>  <b>Discussion: Modern Synthesis</b>	For Class: — Ch. 2  For Discussion: — Mayr 1993	  <b><i>Precis-Jan. 30</i></b>
5	Feb. 2 Feb. 4 Feb. 6	Mechanisms: Selection  Mechanisms: Selection  <b>Discussion on Darwin's Finches</b>	For Class — Ch. 3  For Discussion: — Grant and Grant 2003	  <b><i>Precis Feb. 6</i></b>

6	Feb. 9	Mechanisms: Sexual Selection	<i>For Class:</i> – Ch. 16	<b><i>Review/Reflection of Dobzhansky—Feb 11</i></b>
	Feb. 11	Mechanisms: Sexual Selection	<i>For Discussion:</i> – Simmons and Emlen 2006	<b><i>Precis Feb. 13</i></b>
	Feb. 13	<b>Discussion: Trade-offs</b>		
7	Feb. 16	<b><i>Holiday—NO CLASS</i></b>		<b><i>Exam 1—Feb 20</i></b>
	Feb. 18	Mechanisms: Drift/Gene Flow	<i>For Discussion:</i> – Dobzhansky 1957	<b><i>Precis Feb. 20</i></b>
	Feb. 20	<b>Discussion: Genetic Drift</b>		
8	Feb. 23	Hardy-Weinberg	<i>For Class:</i> – Ch. 7-8	
	Feb. 25	Hardy-Weinberg		<b><i>Outline and Annotated Bibliography- Feb. 27</i></b>
	Feb. 27	Hardy-Weinberg Work Day		
9	Mar. 2	Hardy-Weinberg Work Day	<i>For Class:</i> – Ch. 14.1	<b><i>Hardy-Weinberg Probs—Mar. 4</i></b>
	Mar. 4	What is a species?		
	Mar. 6	<b>Discussion: What is a species?</b>	<i>For Discussion:</i> – Mayr 1996	<b><i>Precis Mar. 6</i></b>
-	Mar. 8-14	<b><i>SPRING BREAK—NO CLASS</i></b>		
10	Mar. 16	What is a species?	<i>For Class:</i> – Ch. 14.2-3	
	Mar. 18	What is a species?		
	Mar. 20	<b>Discussion: Why are there so many animals?</b>	<i>For Discussion:</i> – Hutchinson 1959	<b><i>Precis Mar. 20</i></b>
11	Mar. 23	Speciation	For Class – Ch. 14.3-4	<b><i>Meet with Dr. Hjelmen by Mar. 27</i></b>
	Mar. 25	Speciation		<b><i>Precis Mar. 27</i></b>
	Mar. 27	<b>Discussion: Skepticism to Santa Rosalia</b>	<b>For Discussion:</b> – Felsenstein 1981	

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12	Mar. 30	Phylogenetics Hands on	<i>For Class</i> – Ch. 4 and 5	<b>Precis Apr. 3</b>
	Apr. 1	Phylogenetics Hands on		
	Apr. 3	<b>Discussion: Reaffirmation of Santa Rosalia</b>	<i>For Discussion:</i> – Bush 1993	
13	Apr. 6	Speciation and Human Evolution	<i>For Class</i> – Ch. 19	<b>Poster Draft Due Apr. 3</b>
	Apr. 8	Review of posters		<b>Peer Review for Posters Due Apr. 6</b>
	Apr. 10	Review of posters		
14	Apr. 13	Human Evolution	<i>For Class</i> – Ch. 19	<b>Final Posters due by Apr. 10</b>
	Apr. 15	Human Evolution		
	Apr. 17	<b>Poster Presentations</b>		
15	Apr. 20	<b>Discussion: Biological Classification</b>	<i>For Discussion:</i> – Mayr 1981	<b>Group Evaluation due Apr. 21</b> <b>Precis Apr. 20</b> <b>Exam 2 Due Apr. 22</b>

**Final Assignment: Due Apr 26 by 11:59pm**