Term Information

Effective Term   Spring 2023

General Information

Course Bulletin Listing/Subject Area	Entomology
Fiscal Unit/Academic Org	Entomology - D1130
College/Academic Group	Food, Agric & Environ Science
Level/Career	Undergraduate
Course Number/Catalog	1351
Course Title	Experimentally Evaluating the Biology of Hope and Belief
Transcript Abbreviation	Exp Eval Biol Hope
Course Description	This course provides an introduction to and foundation for the study of Natural Science by allowing us to explore the experimental evidence that supports whether the human capacity to hope and believe in a higher power is hardwired into our biology and could have been acted upon by Natural Selection as humans evolved.
Semester Credit Hours/Units	Fixed: 1

Offering Information

Length Of Course	14 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
Grading Basis	Letter Grade
Repeatable	No
Course Components	Laboratory
Grade Roster Component	Laboratory
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark, Wooster

Prerequisites and Exclusions

Prerequisites/Corequisites	1350, or concurrent enrollment.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	26.0702
Subsidy Level	General Studies Course
Intended Rank	Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

Natural Sciences

Course Details

Course goals or learning objectives/outcomes
- Understand the biological basis of hope and belief among humans and other animals
- Become scientifically literate and learn how science is done and how to interpret and analyze scientific results
- Gain an abiding appreciation for the importance of hope and belief to humans and our societies

Content Topic List
- Quantitative and qualitative data
- Scientific hypotheses
- Linear regression, t-tests,correlation and causation
- Phylogeny and taxonomy
- Meditation
- Animals and hope
- Effects of hope on the brain
- Evidence of hope and belief in early humans
- Central dogma of biology
- God gene

Sought Concurrence   No

Attachments

- 2022.04.22_Overview of Laboratory Exercises.docx: Laboratory descriptions

  (Other Supporting Documentation. Owner: Klinger,Ellen G)

- 2022.06.06_Distance Approval Cover Sheet ENTMLGY 1351.docx: Distance Approval

  (Other Supporting Documentation. Owner: Klinger,Ellen G)

- 2022.06.28ENTMLGY 1350_GE-foundations-submission form_REVISED.3.pdf: GE Natural Science Form

  (Other Supporting Documentation. Owner: Klinger,Ellen G)

- 2022.06.28_ENTMLGY 1351 Syllabus_ODEE template_Revised 3.pdf: Revised Syllabus

  (Syllabus. Owner: Klinger,Ellen G)

Comments

- Syllabus revised per email June 14 2022 *(by Klinger,Ellen G on 06/29/2022 10:52 AM)*
- Revise as per COAA via email message 14 June 2022

  Revise as per email message 2 June 2022 *(by Osborne,Jeanne Marie on 06/14/2022 02:03 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Klinger,Ellen G	05/09/2022 02:00 PM	Submitted for Approval
Approved	Strange,James P	05/12/2022 01:21 PM	Unit Approval
Revision Requested	Osborne,Jeanne Marie	06/02/2022 02:26 PM	College Approval
Submitted	Klinger,Ellen G	06/08/2022 01:37 PM	Submitted for Approval
Approved	Strange,James P	06/08/2022 05:09 PM	Unit Approval
Revision Requested	Osborne,Jeanne Marie	06/14/2022 02:03 PM	College Approval
Submitted	Klinger,Ellen G	06/29/2022 10:53 AM	Submitted for Approval
Approved	Klinger,Ellen G	06/29/2022 10:53 AM	Unit Approval
Approved	Osborne,Jeanne Marie	06/29/2022 04:25 PM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	06/29/2022 04:25 PM	ASCCAO Approval

Syllabus
ENTMLGY 1351

Experimentally Evaluating the Biology of Hope and Belief
Spring Semester 2023
GE Foundations, Natural Science
All Semesters: Online Sections

Course Information

- **Course times and location:** This is a fully asynchronous online course.

- **Credit hours:** 1 credit hour

- **Mode of delivery:** Distance Learning

Instructor

- **Name:** Dr. Megan Meuti

- **Email:** meuti.1@osu.edu

- **Office location:** 232C Howlett Hall

- **Office hours:** Times are posted on Carmen; we will meet by Zoom

- **Office phone**: 614-688-2829

- **Preferred means of communication:**

  o My preferred method of communication for questions is **email.**

  o My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites and/or co-requisite:

- **ENTMLGY 1350: The Biology of Hope and Belief (3 credit hour lecture)** should be taken concurrently (in the same semester) or previously.

- Together the ENTMLGY 1350 Lecture (3 credits) and ENTMLGY 1351: Experimentally Evaluating The Biology of Hope and Belief (1 credit) fulfill the 4-credits of the General Education (GE) Foundations, Natural Science course requirement.

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Course Description

Welcome to this fully online, asynchronous course! This course, along with the required pre-requisite or co-requisite (ENTMLGY 1350: The Biology of Hope and Belief), provides an introduction to and foundation for the study of Natural Science by allowing us to explore the experimental evidence that supports whether the human capacity to hope and believe in a higher power is hardwired into our biology and could have been acted upon by Natural Selection as humans evolved. In this fully asynchronous, online lab, you will interact with the natural world and fully employ the methods used by modern natural scientists/biologists to generate hypotheses, collect and analyze data, read and critique scientific literature and thereby fully engage in the process of science, and use the scientific method to make new collaborative discoveries through modeling and data analysis. In short, this is where we will get to "play" and explore together!

General Education Goals & Expected Learning Outcomes

This course and ENTMLGY 1350: The Biology of Hope and Belief fulfill the General Education (GE) rationale for the GE Foundations: Natural Sciences category. Specifically, ENTMLGY 1351 (this course) primarily fulfils Natural Sciences Goal 1 and Expected Learning Outcome (ELO) 1.3, although Goal 2 and other ELOs are also partially fulfilled by this course. When this 1-credit ENTMLGY 1351 laboratory is taken in combination with the 3-credit ENTMLGY 1350 lecture, together these 4 credits (e.g. 3-credit lecture + 1-credit laboratory) fulfill ALL Goals (Goals 1 and 2) and ALL Expected Learning Outcomes (ELOs 1.1, 1.2, 1.3, 2.1, 2.2 and 2.3) for the GE Foundations, Natural Science category. Therefore, these courses are designed to prepare students to be able to do the following:

GOAL 1: engage in theoretical and empirical study within the natural sciences, gaining an appreciation of the modern principles, theories, and modes of inquiry used generally across the natural sciences.

  1.1   explain basic facts, principles, theories and methods of modern natural sciences; describe and analyze the process of scientific inquiry.
  1.2   identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods.
  1.3   employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models, and analysis of data.

GOAL 2: discern the relationship between the theoretical and applied sciences, while appreciating the implications of scientific discoveries and the potential impacts of science and technology.

  2.1   analyze the inter-dependence and potential impacts of scientific and technological developments.

  2.2   evaluate social and ethical implications of natural scientific discoveries.

  2.3   critically evaluate and responsibly use information from the natural sciences.

- This course fulfills both the Natural Science GE and course-specific (see-below) learning goals and outcomes by allowing students to fully engage with the scientific process by formulating hypotheses, designing experiments, collaboratively collecting and analyzing, and interpreting scientific data. We will also discuss the merits and limitations of the information so that they can critically evaluate and responsibly use scientific information on the biological basis of hope and belief in humans. This is largely done by allowing students to complete weekly laboratory exercises/ assignments.

- To clearly see how these course goals and learning objectives are assessed, and how they relate to the above Natural Science GE goals, please see the alignment table on pgs.10 and 11.

Course-specific Learning Goals

I.   understand the biological basis of hope and belief among humans and other animals.
II.   become scientifically literate and learn how science is done and how to interpret and analyze scientific results.
III.   gain an abiding appreciation for the importance of hope and belief to humans and our societies.

Course-specific Learning Outcomes

By the end of this course, students should successfully be able to:

1. articulate how the process of evolution by the means of natural selection could have contributed to the human capacity for hope and belief.

2. compare and contrast human neurobiology and behavior with those of other animals.

3. distinguish between scientific and religious epistemological frameworks, identify when each are useful and how they can coexist.

4. examine neurobiological, behavioral, genetic and social evidence supporting the biological basis for hope and belief.

5. articulate how new scientific ideas and technological advancements have contributed to our understanding of hope and belief.

6. integrate biological information and other forms of data to evaluate the impact of hope and belief on human well-being

7. evaluate the social and ethical implications of understanding hope/belief in animals and humans.

8. understand how science is done.

- This course fulfills both the Natural Science GE and course-specific learning goals and outcomes by allowing students to fully engage with the scientific process by formulating hypotheses, designing experiments, collaboratively collecting and analyzing, and interpreting scientific data, as well as discussing the merits and limitations of the information so that they can critically evaluate and responsibly use scientific information on the biological basis of hope and belief in humans. This is largely done by allowing students to complete weekly laboratory exercises/assignments.

- To clearly see how these course goals and learning objectives are assessed, and how they relate to the above GE goals, please see the alignment table on pgs. 10 and 11.

How this course works

Mode of delivery: This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time.

Pace of online activities: This course is divided into **weekly modules** that are released one week ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a 1 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 1 hour per week of time spent on direct instruction (reading assigned articles and watching instructor-generated videos) in addition to 2 hours of homework (completing laboratory assignments) to receive a grade of C average. Those who do typically earn an "A" in my courses.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Participating in online activities for attendance**: **at least once per week**
  You are expected to log in to the course in Carmen every week. During most weeks you will probably log in many times. If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*

- **Zoom meetings and office hours**: **optional**
  All live, scheduled events for the course, including my office hours, are optional. I will post recordings of synchronous sessions for those who cannot attend.

- **Participating in discussion forums**: **optional**
  To earn extra credit (see information below), you may post or answer questions on a group discussion forum and/or respond to questions related to that week's specific activity.

Course Materials, Fees and Technologies

Required Materials

- All required readings and video lectures will be freely provided on the Carmen website

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection

- **Webcam:** built-in or external webcam, fully installed and tested

- **Microphone:** built-in laptop or tablet mic or external microphone

- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at go.osu.edu/student-tech-access.

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the installing Office 365 (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.

- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.

- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration and recording, editing and uploading video (go.osu.edu/video-assignment-guide)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Points	Percentage of final grade
Syllabus Assessment	10	~2%
Laboratory Assignments (1 per week for 13 weeks)	30 pts each = 390 pts	~87%
Laboratory Final	50 pts	~11%

See Course Schedule for due dates.

Descriptions of Major Course Assignments

Syllabus Assessment

Description: This assessment is used to ensure that you have read and understand the policies, expectations and course format described in the syllabus. You must complete this by **Friday January 14th at 11:59 pm Eastern Time** so that you can unlock and access other course content.

Academic integrity and collaboration: This quiz is open-book and untimed. Students must complete the syllabus quiz on their own, but they will have multiple untimed opportunities to take the quiz.

Laboratory Assignments

Description: You will be asked to complete an assignment each week for 13 weeks. These will allow you to fully engage with the scientific process by either formulating hypotheses, designing experiments, critiquing existing studies as well as gathering, analyzing and interpreting scientific data. *Unless otherwise stated, all responses must be typed and submitted as a PDF file to the TurnItIn dropbox on the Carmen course website*. Each assignment is worth 30 points and will be **due by 11:59 pm Eastern Time on the Tuesday following the week it is posted.**

Academic integrity and collaboration: Each student must turn in a lab report that is their own work. While in some laboratory cases we will use shared data, all your responses to the questions and analyses should be your own. Students may work with other students on specific areas that will be clearly designated by the instructor

within the Carmen assignment.

Laboratory Final

Description: At the end of the semester you will write an informed critique of a scientific study that claimed to find "The God Gene," and design a novel experiment that will allow you to uncover the genetic basis for hope and/or belief.

Academic integrity and collaboration: Each student must turn in Final Reflection Paper that represents their own work. This assignment will be submitted to a "TurnItIn" dropbox on Carmen, which will check your submission against other students' work and published information on the internet. You will be able to see your similarity score and can revise and resubmit your final reflection if TurnItIn identifies specific areas that are potentially problematic.

Extra Credit Opportunities

Up to 25 pts = 5% of your final grade

- **Midterm feedback survey:** This anonymous survey will allow you to provide valuable feedback on what is helping or hindering your learning in this course so that I can improve it this the semester and in future offerings. This survey will be available during the 7th week of classes (*Due Friday February 17th*) and will be worth 5 points.

- **Participation in weekly discussions:** For 10 weeks with normally scheduled modules, an optional extra credit discussion board will be available. You can use this space to ask a question, answer a peer's question or reflect on how the course material relates to your life. You can earn up to 1 extra credit point for each week that you participate (maximum of 10 points).

- **Extra Credit on laboratory assignments**: Each laboratory assignment will have an extra credit question on it. I strongly encourage you to answer these so that if you miss points elsewhere, you can recoup some of them.

- **Attending Zoom office hours/study sessions:** Participation in these sessions will be worth up to 5 pts/session (maximum of 15 extra credit points).

Alignment Table

GE Goal	GE ELO	Course ELOs	Course Assessments	How assessments support GE ELO
GOAL I: Successful students will engage in theoretical and empirical study within the natural sciences, gaining an appreciation of the modern principles, theories, methods, and modes of inquiry used generally across the natural sciences.	**1.1:** Successful students are able to explain basic facts, principles, theories and methods of modern natural sciences; describe and analyze the process of scientific inquiry.	1. Articulate how the process of evolution by the means of natural selection could have contributed to the human capacity for hope & belief. 2. Compare and contrast human neurobiology and behavior with those of other animals. 3. Distinguish between scientific and religious epistemological frameworks, identify when each are useful & how they can coexist.	Laboratory 3: Evaluating the impact of prayer/meditation on your own biology Laboratory 4: Design an experiment to evaluate the neurobiological basis of belief	These assessments will allow students to *describe and analyze the process of scientific inquiry* by allowing students to formulate and test hypotheses on how prayer/meditation impact their biology (e.g. resting heart rate) and how they as scientists could use brain imaging technologies to uncover which areas of the brain are affected (e.g. show activity; change in size over time) by belief.
	1.2: Successful students are able to identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods.	4. Examine neurobiological, behavioral, genetic and social evidence supporting the biological basis for hope and belief. 5. Articulate how new scientific ideas and technological advancements have contributed to our understanding of hope and belief.	Laboratory 2: Animal Phylogeny and Models of Hope and Belief Laboratory 6: Genetic basis of hope and belief in humans	These assessments will allow students to *identify how key events in the development of science* (e.g. Theory of Evolution, increased understanding of human/animal brain, sequencing of the human genome) contribute to *ongoing and changing nature of scientific knowledge* (e.g. which animals are good/bad models for hope and belief) and *methods used by natural scientists* (e.g. constructing phylogenetic trees; searching publicly available databases).
	1.3: Successful students will employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models and analysis of data.	1. Articulate how the process of evolution by the means of natural selection could have contributed to the human capacity for hope and belief. 8. Describe how science is done and what makes for credible science	***All laboratory exercises will fulfil this ELO and course learning objectives*** Final Reflection Paper: Did Hamer responsibly use scientific information when he wrote the God Gene?	These assessments will allow students to employ the *process of science* by *developing hypotheses* (e.g. Lab 1: how religious beliefs affect acceptance of evolution), *designing experiments* (e.g. Lab 4: design an experiment to show how beliefs affect the brain), and *exploring scientific literature and other credible sources* (e.g. Final Reflection Paper/Critique of the "God Gene" hypothesis).

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GE Goal	GE ELO	Course ELOs	Course Assessments	How assessments support GE ELO
GOAL II: Successful students will discern the relationship between the theoretical and applied sciences, while appreciating the implications of scientific discoveries and the potential impacts of science and technology.	**2.1** Successful students are able to analyze the inter-dependence and potential impacts of scientific and technological developments.	5. Articulate how new scientific ideas and technological advancements have contributed to our understanding of hope and belief. 6. Integrate biological information and other forms of data to evaluate the impact of hope and belief on human well-being.	Laboratory 3: Evaluating the impact of prayer/meditation on your own biology Laboratory 4: Design an experiment to evaluate the neurobiological basis of belief	These assignments will allow students to analyze the _inter-dependence of science and technology_ (e.g. how advancements in brain imaging technology are improving our understanding of hope/belief) and the _potential impacts of scientific and technological advancements_ (e.g. how science/technology can demonstrate the benefits of hope/belief on human physiology).
	2.2. Successful students are able to evaluate social and ethical implications of natural scientific discoveries.	5. Articulate how new scientific ideas and technological advancements have contributed to our understanding of hope and belief. 7. Evaluate the social and ethical implications of understanding hope/belief in animals and humans.	Lab 2: Animal Phylogeny and Models of Hope and Belief Lab 5: Anthropological data demonstrating the biological and beneficial basis of hope in humans	These assignments will allow students to examine _natural scientific discoveries_ (e.g. shared evolutionary relationships among humans and other animals; changes that took place in the human anatomy and physiology as we evolved) and evaluate their _social and ethical implications_ (e.g. whether it is ethical to use animals in specific types of research; how changes in human anatomy contributed to changes in societies/belief structures).
	2.3 Successful students are able to critically evaluate and responsibly use information from the natural sciences.	3. Distinguish between scientific and religious epistemological frameworks, identify when each are useful and how they can coexist 4. Examine neurobiological, behavioral, genetic and social evidence supporting the biological basis for hope and belief. 6. Integrate biological information and other forms of data to evaluate the impact of hope and belief on human well-being.	Laboratory 1: Relationship between belief and knowledge/acceptance of evolution Laboratory 6: Genetic basis of hope and belief in humans Final Reflection Paper: Did Hamer responsibly use scientific information when he wrote the God Gene?	These assessments will allow students to _critically evaluate information from the natural sciences_ (e.g. Lab 1 describe the difference between correlation and causation; Lab 6: how variations in gene sequence affect us) and _use this information responsibly_ (e.g. Final Reflection Paper).

Late Assignments

- Please refer to Carmen for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. Meeting deadlines is an important aspect *of professionalism in ALL future careers*. Please plan carefully. Deadlines for submitting assigned work are firm, and extensions will NOT be granted for conflicts with the work or other courses, or technological difficulties with Carmen.
    - *Accommodations due to illness or other personal situations are granted only with appropriate documentation (doctor's note, obituary, etc.).* If you need an extension for a family emergency or medical reason, please email me before 5:00 pm on the day the assignment/unit assessment is due, or within 24-hours of an emergency or illness. Whenever possible, please provide the documentation.

    - *Advanced accommodations:* If you need to have an adjusted schedule (e.g., military duty prevents you from opening or submitting assignments during posted window, etc.), please email Dr. Meuti at least 2 weeks prior to requested schedule changes.

    - *Late work*: To ensure that we all stay on track and that your work does not pile up, assignments/Unit Assessments that are submitted late will receive a 10% penalty for every day they are late, up to 3 days late. After that time, your assignment will not be graded for credit.

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**, or **36 hours on the weekend/university holiday.** *If you have not heard back within this timeframe, you can and should send an additional email.* Please do NOT send multiple emails within a 24 hr period or use Canvas to contact me.

- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.

- **Discussion board:** I will check and reply to messages in the discussion boards once mid-week and once at the end of the week.

- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

- **Grading philosophy:** Your weekly laboratory assignments will be graded by a team of students who previously took the course. I will grade your Final Reflection Paper. Please note that the graders and I do NOT give you points, nor do we take away points away from you. *You either earn or do not earn points on assignments*. The graders and I want you to earn the highest grade possible on every assignment and assessment! I am here to help you by clarifying any instructions and answering questions that you have. 😊 However, ultimately your grade is up to you.

- **Grade Disputes:** Graded material will be made available to you on Carmen. I encourage you to carefully look over the feedback on your assignments. Please be sure to see me during office hours (preferred) or email me if you do not understand why any of your answers were incorrect/did not earn full credit. If you feel that a mistake was made on an assignment, you have the right to dispute the grade. You must discuss your dispute with me no later than **two weeks after the graded assignment has been made available to you**. After that time, the grade will be final.

Grading Scale

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70–72.9: C-
67–69.9: D+
60–66.9: D
Below 60: E

Other Course Policies

General Policies and Expectations

- **Class participation:** I expect you to complete the assigned readings and watch the lab tutorials each week so that you can thoughtfully complete laboratory assignments. I expect you to be respectful of your peers, graders and me.

- **Notetaking:** As I want you to earn the highest grade possible, and because full participation in class activities is crucial for success, I expect you to treat this class with the same respect, attention and planning as you treat your other, in-person classes. Therefore, you *should take notes both when reading the course articles and when watching the lectures*. You should complete your readings and watch the recorded lectures in a quiet place, free from other distractions. Research shows that students learn best and retain the most information when they take notes by hand (***Bonner and Holliday, 2006 J. Research in Science Teaching***). 😊

- **Staying informed:** We will closely follow the schedule on the syllabus and will provide updates and reminders to ensure that you are staying on track. If I have to make modifications or adjustments to the course, provide further details or clarification, and/or schedule review sessions, I will post a course announcement. Students are responsible for all information communicated via email and course announcements. Therefore, I expect you to *check the course website and your OSU email at least once per week*.

- **Managing class data**: Consider composing your academic posts in a word processor or using a program like Excel/Google sheets to save your work, ideally to a cloud-based system. This will allow you to then copy responses into Carmen discussions, and more easily submit your assignments to their associated dropboxes within Carmen. Additionally, this will protect against data loss if your computer malfunctions or gets lost or stolen.

- **Scientific rigor:** I understand that most of you are NOT scientists and are likely intimidated by a science GE course, and especially math/data analysis. However, while this course is a biology class and will require you to learn important scientific concepts, *this course is not designed to be difficult or onerous*. You will have to think critically and connect course concepts. You are all bright, capable and enthusiastic Buckeyes who belong to be here! *I have every confidence that you will succeed in this course and earn the grade that you want*.

- **Scheduling:** I will post the module for each week on Tuesdays at 12:00 am Eastern Time. The module page will contain the overview describing the week's tasks, readings, lab tutorial and laboratory activity/assignment. Laboratory assignments will be due the following Sunday by 11:59 PM Eastern Time, giving you 10 days to complete the assignment.

- **Synchronous sessions**: During optional extra credit, synchronous Zoom sessions, I ask you to use your real name and a clear photo of your face. Please also use a clear picture of your face in your Carmen profile. When in breakout rooms or other small-group discussions, having cameras and mics on as often as possible will help you get the most out of activities. You are always welcome to use the free, Ohio State-themed virtual backgrounds (go.osu.edu/zoom-backgrounds). Remember that Zoom and the Zoom chat are our classroom space where respectful interactions are expected.

- **Specific expectations for online discussions**
  - **Writing style**: While there is no need to complete your laboratory reports as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics, and especially in discussions.
  - **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online. I will provide specific guidance for discussions on controversial or personal topics.
  - **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.

- **Statement of Intent:** By remaining in this course, you are agreeing to abide by the guidelines outlined in this syllabus. As instructors, we reserve the right to update and/or correct this syllabus. We will notify you should there be a necessary change to the syllabus.

Academic Integrity Policy

See Descriptions of Major Course Assignments for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's Code of Student Conduct (studentconduct.osu.edu), and that all students will complete all academic and scholarly

assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.
If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct (go.osu.edu/coam)

- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. All PowerPoints and other instructional materials in this course are the intellectual property of the presenter and/or instructor. They are not to be shared beyond the course without the expressed written consent of the instructor(s). Recognizing that your work is also your intellectual property, we will not share or distribute your work without your permission.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.

- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand mental health resources (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at 614- 292-5766. **24-hour emergency help** is available through the National Suicide Prevention Lifeline website (suicidepreventionlifeline.org) or by calling 1-800-273-8255(TALK). The Ohio State Wellness app (go.osu.edu/wellnessapp) is also a great resource.

For CFAES students, David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

Accessing the Writing Center

Many students struggle to clearly express their ideas in writing. Fortunately, the **Writing Center** offers free help with writing at any stage of the writing process for all students. During their sessions, consultants can work with you on anything from research papers to lab reports, from dissertations to résumés. Appointments are available in-person at 4120 Smith Lab, as well as for online. You may schedule an in-person or online appointment by visiting WC Online or by calling 614-688-4291. Please note that the Writing Center also offers daily walk-in hours—no appointment necessary—in Thompson Library. You do not have to bring in a piece of writing in order to schedule a writing center appointment. Many students report that some of their most productive sessions entail simply talking through ideas.

Diversity Statement

The Ohio State University affirms the importance and value of diversity of people and ideas. We believe in creating equitable research opportunities for all students and to providing programs and curricula that allow our students to understand critical societal challenges from diverse perspectives and aspire to use research to promote sustainable solutions for all. We are committed to maintaining an inclusive community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members;

and encourages each individual to strive to reach their own potential. The Ohio State University does not discriminate on the basis of age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, gender, sexual orientation, pregnancy, protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment.

To learn more about diversity, equity, and inclusion and/or to get involved, please visit:

- https://odi.osu.edu/
- https://odi.osu.edu/racial-justice-resources
- https://odi.osu.edu/focus-on-racial-justice
- http://mcc.osu.edu/

Principles of Community Statement

In addition, this course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at https://go.osu.edu/principlesofcommunity. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (https://equityandinclusion.cfaes.ohio-state.edu/). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at https://equity.osu.edu/.'

Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services (SLDS). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: 614-292-3307

- Website: slds.osu.edu

- Email: slds@osu.edu

- In person: Baker Hall 098, 113 W. 12th Avenue

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- CarmenCanvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)

Laboratory Schedule

Refer to the CarmenCanvas course for up-to-date due dates.

Laboratory Theme	Course Week	Reading	Watching	Doing (Assignments)
Orientation/ Expectations	1	Laboratory Syllabus	Orientation video	Laboratory Syllabus Assessment
Qualitative vs. quantitative understanding of evolution	2	Article on types of data and how to convert them	Lab 1a: Quantitative and qualitative understanding of evolution	Assignment 1a: Form hypotheses and administer surveys
	3	Readings on sample size, and linear regression	Lab 1b: Introduction to linear regression	Assignment 1b: Create a graph of your individual data and class data
	4	Readings on correlation vs. causation	Lab 1c: How to interpret data	Assignment 1c: Interpretation of data and reflection
Phylogenetic/ evolutionary basis of hope and belief	5	Readings on how to understand and interpret phylogeny	Lab 2a: Introduction to phylogenetics and taxonomy	Assignment 2a: Observe and take pictures of 5 animals and arrange them in a phylogenetic tree
	6	Readings on hope in animals	Lab 2b: Elements of experimental design	Assignment 2b: Design an experiment to test which animals are most hopeful
Evaluating the positive effects of meditation on human physiology	7	Review article on benefits of meditation on the brain	Lab 3a: Tutorial on how to collect heart rate and meditate	Assignment 3a: Experimental evidence on how hope and belief affect you personally
	8	Article on t-tests	Lab 3b: Tutorial on how to conduct a Student's T-test	Assignment 3b: Analyze and interpret personal vs. class data on the benefits of meditation
Using brain imaging technologies to enable scientific discoveries on hope and belief	9	Andy Newberg's experiments of brain scans of monks and nuns	Lab 4a: Developing a sound research question	Assignment 4a: Formulate a testable hypothesis of how belief affects the brain
	10	Article comparing different brain imaging techniques	Lab 4b: Balancing experimental design with budgetary restrictions	Assignment 4b: Design an experiment to test your hypothesis within budgetary constraints

Laboratory Theme	Course Week	Reading	Watching	Doing (Assignments)
Evidence of hope and belief in early humans	11	Article on the types of data available to biological anthropologists	Lab 5a: Evaluating early human evidence	Assignment 5a: Find 2-3 peer reviewed, research articles that provide evidence that show how changes in human development facilitated belief/religion
	12	Strategy for reading and understanding scientific research articles	Lab 5b: How to read and interpret a scientific paper	Assignment 5b: Critique the articles that you found
Genetic evidence of hope and belief in humans	13	Article/excerpt from introductory text on the Central Dogma	Lab 6a: Tutorial on how to use GenBank and 100,000 human genomes project	Assignment 6a: Compare the genomic variation of "the God gene"
	14	Article about polygenic traits and environmental influences	Lab 6b: Why many genes are involved in complex traits	Assignment 6b: Compare genomic variation of a gene involved in hope/belief and one that isn't
	15	Excerpts from the God Gene and a critique of the study	Final Tutorial: Putting it all together	Laboratory Final: Critique Dean Hamer's "God Gene" study (is it a responsible use of scientific information?) and evaluate the potential of genetics to understand hope & belief

GE Foundation Courses

Overview

Courses that are accepted into the General Education (GE) Foundations provide introductory or foundational coverage of the subject of that category. Additionally, each course must meet a set of Expected Learning Outcomes (ELO). Courses may be accepted into more than one Foundation, but ELOs for each Foundation must be met. It may be helpful to consult your Director of Undergraduate Studies or appropriate support staff person as you develop and submit your course.

This form contains sections outlining the ELOs of each Foundation category. You can navigate between them using the Bookmarks function in Acrobat. Please enter text in the boxes to describe how your class meets the ELOs of the Foundation(s) to which it applies. Because this document will be used in the course review and approval process, you should use language that is clear and concise and that colleagues outside of your discipline will be able to follow. Please be as specific as possible, listing concrete activities, specific theories, names of scholars, titles of textbooks etc. Your answers will be evaluated in conjunction with the syllabus submitted for the course.

Accessibility

If you have a disability and have trouble accessing this document or need to receive the document in another format, please reach out to Meg Daly at daly.66@osu.edu or call 614-247-8412.

GE Rationale: Foundations: Race, Ethnicity, and Gender Diversity (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** the expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Race, Ethnicity, and Gender Diversity, please answer the following questions for each ELO.

A. Foundations
Please explain in 50-500 words why or how this course is introductory or foundational for the study of Race, Ethnicity and Gender Diversity.

Course Subject & Number: _____

B. Specific Goals of Race, Ethnicity, and Gender Diversity

GOAL 1: Successful students will engage in a systematic assessment of how historically and socially constructed categories of race, ethnicity, and gender, and possibly others, shape perceptions, individual outcomes, and broader societal, political, economic, and cultural systems.

Expected Learning Outcome 1.1: Successful students are able to describe and evaluate the social positions and representations of categories including race, gender, and ethnicity, and possibly others. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.2: Successful students are able to explain how categories including race, gender, and ethnicity continue to function within complex systems of power to impact individual lived experiences and broader societal issues. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.3: Successful students are able to analyze how the intersection of categories including race, gender, and ethnicity combine to shape lived experiences. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications of studying race, gender, and ethnicity. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

GOAL 2: Successful students will recognize and compare a range of lived experiences of race, gender, and ethnicity.

Expected Learning Outcome 2.1: Successful students are able to demonstrate critical self- reflection and critique of their social positions and identities. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 2.2: Successful students are able to recognize how perceptions of difference shape one's own attitudes, beliefs, or behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 2.3: Successful students are able to describe how the categories of race, gender, and ethnicity influence the lived experiences of others. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met.

GE Rationale: Foundations: Social and Behavioral Sciences (3 credits)

Requesting a GE category for a course implies that the course **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Social and Behavioral Sciences, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Social and Behavioral Sciences.

B. Specific Goals of Social and Behavioral Sciences

GOAL 1: Successful students will critically analyze and apply theoretical and empirical approaches within the social and behavioral sciences, including modern principles, theories, methods, and modes of inquiry.

Expected Learning Outcome 1.1: Successful students are able to explain basic facts, principles, theories and methods of social and behavioral science. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.2: Successful students are able to explain and evaluate differences, similarities, and disparities among institutions, organizations, cultures, societies, and/or individuals using social and behavioral science. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

GOAL 2: Successful students will recognize the implications of social and behavioral scientific findings and their potential impacts.

Expected Learning Outcome 2.1: Successful students are able to analyze how political, economic, individual, or social factors and values impact social structures, policies, and/or decisions. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 2.2: Successful students are able to evaluate social and ethical implications of social scientific and behavioral research. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 2.3: Successful students are able to critically evaluate and responsibly use information from the social and behavioral sciences. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

GE Rationale: Foundations: Historical or Cultural Studies (3 credits)

Requesting a GE category for a course implies that the course fulfills the expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Historical and Cultural Studies, please answer the following questions for each ELO. Note that for this Foundation, a course need satisfy **either** the ELOs for Historical Studies **or** the ELOs for Cultural Studies.

A. Foundations
Please explain in 50-500 words why or how this course is introductory or foundational in the study of History **or** Cultures.

B. Specific Goals of Historical *or* Cultural Studies

Historical Studies (A) Goal: Successful students will critically investigate and analyze historical ideas, events, persons, material culture and artifacts to understand how they shape society and people.

Expected Learning Outcome 1.1A: Successful students are able to identify, differentiate, and analyze primary and secondary sources related to historical events, periods, or ideas. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.2A: Successful students are able to use methods and theories of historical inquiry to describe and analyze the origin of at least one selected contemporary issue. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.3A: Successful students are able to use historical sources and methods to construct an integrated perspective on at least one historical period, event or idea that influences human perceptions, beliefs, and behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.4A: Successful students are able to evaluate social and ethical implications in historical studies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Cultural Studies (B) Goal: Successful students will evaluate significant cultural phenomena and ideas to develop capacities for aesthetic and cultural response, judgment, interpretation, and evaluation.

Expected Learning Outcome 1.1B: Successful students are able to analyze and interpret selected major forms of human thought, culture, ideas or expression. Please link this ELO to the course goals and topics and identify the *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.2B: Successful students are able to describe and analyze selected cultural phenomena and ideas across time using a diverse range of primary and secondary sources and an explicit focus on different theories and methodologies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.3B: Successful students are able to use appropriate sources and methods to construct an integrated and comparative perspective of cultural periods, events or ideas that influence human perceptions, beliefs, and behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.4B: Successful students are able to evaluate social and ethical implications in cultural studies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met.

GE Rationale: Foundations: Writing and Information Literacy (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Writing and Information Literacy, please answer the following questions for each ELO.

Course Subject & Number: _____

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Writing and Information Literacy.

B. Specific Goals of Writing and Information Literacy

GOAL 1: Successful students will demonstrate skills in effective reading, and writing, as well as oral, digital, and/or visual communication for a range of purposes, audiences, and context.

Expected Learning Outcome 1.1: Successful students are able to compose and interpret across a wide range of purposes and audiences using writing, as well as oral, visual, digital and/or other methods appropriate to the context.
Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. Explain how the course includes opportunities for feedback on writing and revision. Furthermore, please describe how you plan to insure sufficiently low instructor-student ratio to provide efficient instruction and feedback. *(50-700 words)*

Expected Learning Outcome 1.2: Successful students are able to use textual conventions, including proper attribution of ideas and/or source, as appropriate to the communication situation. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. Is an appropriate text, writing manual, or other resource about the pedagogy of effective communication being used in the course? *(50-700 words)*

Expected Learning Outcome 1.3: Successful students are able to generate ideas and informed responses incorporating diverse perspectives and information from a range of sources, as appropriate to the communication situation. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications in writing and information literacy practices. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

GOAL 2: Successful students will develop the knowledge, skills, and habits of mind needed for information literacy.

Expected Learning Outcome 2.1: Successful students are able to demonstrate responsible, civil, and ethical practices when accessing, using, sharing, or creating information. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 2.2: Successful students are able to locate, identify and use information through context appropriate search strategies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 2.3: Successful students are able to employ reflective and critical strategies to evaluate and select credible and relevant information sources. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

GE Rationale: Foundations: Literary, Visual, or Performing Arts (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Literary, Visual, and Performing Arts, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Literary, Visual, or Performing Arts.

B. Specific Goals

Goal 1: Successful students will analyze, interpret, and evaluate major forms of human thought, cultures, and expression; and demonstrate capacities for aesthetic and culturally informed understanding.

Expected Learning Outcome 1.1: Successful students are able to analyze and interpret significant works of design or visual, spatial, literary or performing arts. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.2: Successful students are able to describe and explain how cultures identify, evaluate, shape, and value works of literature, visual and performing art, and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.3: Successful students are able to evaluate how artistic ideas influence and shape human beliefs and the interactions between the arts and human perceptions and behavior. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications in literature, visual and performing arts, and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Goal 2: Successful students will experience the arts and reflect on that experience critically and creatively.

Expected Learning Outcome 2.1: Successful students are able to engage in informed observation and/or active participation within the visual, spatial, literary, or performing arts and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 2.2: Successful students are able to critically reflect on and share their own experience of observing or engaging in the visual, spatial, literary, or performing arts and design.
Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

GE Rationale: Foundations: Natural Science (4 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Natural Sciences, please answer the following questions for each ELO.

A. Foundations
Please explain in 50-500 words why or how this course is introductory or foundational in the study of Natural Science.

B. Specific Goals for Natural Sciences

GOAL 1: Successful students will engage in theoretical and empirical study within the natural sciences, gaining an appreciation of the modern principles, theories, methods, and modes of inquiry used generally across the natural sciences.

Expected Learning Outcome 1.1: Successful students are able to explain basic facts, principles, theories and methods of modern natural sciences; describe and analyze the process of scientific inquiry. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.2: Successful students are able to identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods. Please link this ELO to the course goals and topics and indicate specific activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.3: Successful students are able to employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models, and analysis of data. Please explain the 1-credit hour equivalent experiential component included in the course: e.g., traditional lab, course-based research experiences, directed observations, or simulations. Please note that students are expected to analyze data and report on outcomes as part of this experiential component. *(50-1000 words)*

Course Subject & Number: _____

GOAL 2: Successful students will discern the relationship between the theoretical and applied sciences, while appreciating the implications of scientific discoveries and the potential impacts of science and technology.

Expected Learning Outcome 2.1: Successful students are able to analyze the inter-dependence and potential impacts of scientific and technological developments. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 2.2: Successful students are able to evaluate social and ethical implications of natural scientific discoveries. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 2.3: Successful students are able to critically evaluate and responsibly use information from the natural sciences. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

GE Rationale: Foundations: Mathematical and Quantitative Reasoning (or Data Analysis) (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Mathematical and Quantitative Reasoning (or Data Analysis), please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Mathematical & Quantitative Reasoning (or Data Analysis).

B. Specific Goals for Mathematical & Quantitative Reasoning/Data Analysis

Goal: Successful students will be able to apply quantitative or logical reasoning and/or mathematical/statistical analysis methodologies to understand and solve problems and to communicate results.

Expected Learning Outcome 1.1: Successful students are able to use logical, mathematical and/or statistical concepts and methods to represent real-world situations. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.2: Successful students are able to use diverse logical, mathematical and/or statistical approaches, technologies, and tools to communicate about data symbolically, visually, numerically, and verbally. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.3: Successful students are able to draw appropriate inferences from data based on quantitative analysis and/or logical reasoning. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Course Subject & Number: _____

Expected Learning Outcome 1.4: Successful students are able to make and evaluate important assumptions in estimation, modeling, logical argumentation, and/or data analysis. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Expected Learning Outcome 1.5: Successful students are able to evaluate social and ethical implications in mathematical and quantitative reasoning. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

This laboratory course will consist of 6 laboratory exercises that span 2-3 weeks and will allow students to fully engage with the scientific process from formulating hypotheses and designing experiments to collecting, analyzing and interpreting data. More information about each specific laboratory exercise is included below.

LABORATORY EXERCISE 1: QUALITATIVE VS. QUANTITATIVE UNDERSTANDING OF EVOLUTION.

<u>**Overview and Rationale**</u>: Many people do not accept the Scientific Theory of Evolution by Means of Natural Selection because of their personal religious beliefs. Additionally, scientists must often convert information that is qualitative (a mood, attitude, or behavior) into something that is quantitative. In this exercise, students will learn how scientists use metrics to convert qualitative information into quantitative measures. Moreover, students will see how pooling data together to increase the sample size can reveal larger trends in the data.

<u>**Specific Activities:**</u> Students will first read articles on the differences between qualitative and quantitative data, as well as when and why scientists need to convert qualitative information into qualitative measures (e.g. to facilitate data analysis). Students will then watch a brief recorded lecture on how researchers have developed and validated metrics to quantify human attitudes and understanding of evolution. Students will then apply what they have learned to formulate a hypotheses on how they predict factors like age, frequency of spiritual attendance and education level will affect a person's attitude towards evolution and/or their acceptance of it. Then, students will imagine 4 different people in their own lives that differ in age, frequency of religious attendance and/or education level and complete the surveys on the attitudes/knowledge of evolution as if they were that person. Students will then upload this hypothetical/imagined data into a shared spreadsheet.

For the second week of this laboratory, students will read articles about the importance of large sample sizes and how linear regression can be used to identify correlations between different variables. Students will then watch a pre-recorded lecture tutorial that will guide them on how to perform linear regressions using Microsoft Excel. Students will then test their hypotheses on the relationship between age, frequency of religious attendance and level of education and the attitudes/acceptance of evolution by performing linear regressions in Excel with both their individual data as well as the larger class dataset. They will also reflect on whether their hypotheses were correct, and which dataset was better for revealing the relationship between their chosen variables and why.

For the third week of this laboratory, students will read articles about the difference between correlation and causation, and a scientific research paper that has evaluated how religion/belief affect people's attitudes/acceptance of evolution. They will then watch a pre-recorded video describing how to interpret data from linear regressions, as well as contextualizing the findings from the assigned reading. Students will then write a reflection to compare their findings with those that have been documented in the literature, and to determine which factor, if any, they believe is most important in predicting a person's knowledge or acceptance of evolution.

LABORATORY EXERCISE 2: PHYLOGENETIC/EVOLUTIONARY BASIS OF HOPE AND BELIEF:

Overview and Rationale: Humans are related to all other organisms through our shared evolutionary history. Therefore, if hope is based in our biology, it is highly likely that we would be able to observe vestiges of hope in other animals, and particularly in animals that are most closely related to us, and/or animals that are like us in living in large and complex social groups. In this laboratory exercise, students will observe various animals, predict how closely related they are to humans, and design (but not conduct!) an experiment to determine which animals might be the most hopeful.

Specific Activities: Students will first read articles on what phylogenetic trees are and how they can be interpreted. Then students will watch a brief recorded video on the relationship between taxonomy and phylogenetics. Next, students observe 5 different animals (these could be dogs, cats, squirrels, birds, insects/spiders; literally anything!) and take pictures of them. Then students will apply what they have learned by placing animals on a phylogenetic tree with humans and write a brief paragraph describing why they placed them in the various locations.

Next, students will read scientific articles that have demonstrated hope in animals, including studies that are discussed in the lecture course (e.g Karl Richter's forced swimming experiments in rats and Martin Seligman's experiments on learned helplessness in dogs). Then, students will watch a pre-recorded lecture that will describe good elements of experimental design, specifically drawing from the studies that they have just read. Finally, students will design their own experiment to measure the presence of hope in a non-human animal. Notably, as we will not have IACUC approval, the students will NOT execute/conduct their experiments. 😊

LABORATORY EXERCISE 3: EVALUATING THE POSITIVE EFFECTS OF MEDITATION ON HUMAN PHYSIOLOGY

Overview and Rationale: There is a growing body of literature that shows the benefits of mindfulness meditation on multiple areas of the human brain, including the limbic system and somatosensory cortex that help us better regulate our emotional responses and combat stress. In this laboratory exercise, students will have the ability to evaluate the effects of meditation on their own emotional state and physiology.

Specific Activities: Students will first read a review article/metanalysis that describes the long-term benefits of mindfulness meditation. They will then watch a short, recorded tutorial that will describe how to take their pulse and use an anxiety scale to properly rate their emotional state. Students will then take their baseline heartrate and rank their mood, and they will do this again after both reflecting on a stressful but non-traumatic situation for 5 minutes and completing a 5 minute mindfulness meditation exercise. Students will report their results and write a reflection on their personal experiences. All of the student data will be de-identified and uploaded to a shared course datasheet.

The next week students will read articles on how to conduct different types of Student's T-tests and what these measures do/how scientists use them. Next they will watch a short tutorial on how to complete repeated-measures T-tests in Excel. Finally, students will analyze the course data to determine whether ruminating on stressful situations and/or mindfulness meditation caused a significant change in anxiety levels and heart rate using paired T-tests, and interpret their results.

LABORATORY EXERCISE 4: USING BRAIN IMAGING TECHNOLOGIES TO ENABLE SCIENTIFIC STUDIES ON HOPE AND BELIEF

Overview and Rationale: Several scientists have used brain imaging technologies including functional magnetic resonance imaging (fMRI) and single-photon emission computerized tomography (SPECT) scans to measure human brain activity during intense feelings of romantic love, prayer and meditation. In this exercise, students will have the opportunity to design an experiment that can use these technologies to better understand the neurobiology of hope and belief, and to appreciate the costs associated with scientific research.

Specific Instructions: Students will first read Dr. Andy Newberg's scientific article on his observations of the brains of nuns during prayer and monks who were meditating. They will then watch a short recorded lecture describing how to develop a sound research question and hypothesis. Students will then formulate a hypothesis/research question to evaluate how belief affects the brain. The next week, student will read articles describing the costs and benefits of different types of brain imaging technologies (e.g. fMRI, SPECT, Positron Emission Tomography [PET], computerized tomography [CT scan, aka CAT scan]). They will then watch a brief recorded lecture to remind them of elements of good experimental design (e.g. large sample sizes, control group), while weighing that with budgetary restrictions. Students will then apply what they have learned about the various brain imaging scans to design their scientific study to test their hypothesis/answer their research question given a somewhat limited budget ($50,000).

LABORATORY EXERCISE 5: EVIDENCE OF HOPE AND BELIEF IN EARLY HUMANS

Overview and Rationale: Many researchers have hypothesized that the fact that religious beliefs are a universal element of all human cultures strongly suggests that they have an evolutionary origin. Moreover, early graves that were likely made by *Homo neanderthalensis* suggests that many early human species likely had the capacity for religious belief. However, given the limited evidence that has been preserved, it is difficult for scientists to conclusively make this claim. It is also difficult to demonstrate whether the capacity for hope and belief would have increased the survival and/or reproductive potential of early human groups and hence have been acted upon by natural selection. In this exercise, students will have the opportunity to evaluate and critique the existing scientific evidence for belief in early humans.

Specific Activities: Students will first read an article describing the types of data that are available to biological anthropologists (namely only tools, structures and artifacts that can be preserved for long periods of time). Students will then watch a brief pre-recorded tutorial on the kinds of evidence that we have for belief in early human ancestors. Students will then find 2-3 peer-revied, scientific research articles that provide evidence that suggest that early humans had the capacity for belief/religion, and provide a summary for how they found the articles and why they are of interest.

Next, students will learn how to read and interpret a scientific paper, and specifically how to make informed critiques of the underlying hypothesis, research methods and/or data analysis and interpretation. Students will then read and critique the articles that they have found and write a brief reflection on what kinds of evidence/data they would want to see to be convinced that early humans were religious and/or that this improved their survival.

Overview and Rationale: With the sequencing of the human genome and the recent advent of several commercially available tests (e.g. 23 and Me), we have an unprecedent amount of genetic information at our disposal. If the human capacity for hope and belief are biologically based, this would mean that they can be inherited and hence we should be able to identify genes that are associated with hopefulness/optimism, hopelessness/depression and/or the capacity for spirituality/transcendence. In this laboratory exercise, students will have the opportunity to learn about how genes mediate their effects and recent scientific research that is being made possible thanks to the 100,000 human genomes project. Moreover, students will be able to determine how genes interact with one another as well as environmental factors to mediate their effects, and critique a study that claimed to have isolated THE single "God gene" which encodes the Vesicular Monoamine Transporter 2 (VMAT2) protein.

Specific Activities: Students will first read an article/excerpt from a textbook describing the Central Dogma of biology (that genetic information flows from genes to messenger RNAs to proteins). Students will then watch a pre-recorded tutorial on the 100,000 human genomes project and how to access and use the information. They will then apply what they have learned to compare the amount of genetic variation among the *VMAT2* gene that one scientist classified as The God Gene.

Next, students will read an article about how many traits are polygenic, or encoded by many genes, and that many traits and behaviors are also strongly influenced by the environment. Students will then watch a pre-recorded lecture that explains why many genes are involved in complex traits, as well as the benefits of allowing the environment to influence phenotypic traits. Students will then do a bit of research to identify one gene that they might predict would be involved in the human capacity for religious belief as well as one gene that they think would be completely unrelated to hope and belief. They will then compare the amount of genetic variation within the sequences of these two genes to the *VMAT2* gene identified by Dr. Dean Hamer as the God gene.

Finally, students will read excerpts from the non-peer reviewed book that Dean Hamer published entitled "The God Gene" as well as critiques from the scientific and religious community. The laboratory final will consist of a reflection paper/essay where they synthesize the information that they have learned throughout the entire semester on elements of good experimental design, the importance of sample size, how to accurately analyze different types of qualitative and quantitative data and differences between correlation and causation to critique Hamer's claims and to provide their own thoughts on the potential of using genetic information to understand the biological basis of hope and belief.