| **BIOL 270T: History and Philosophy of Science****Syllabus** |
| --- |
| **Fall 2021** | **California State University, Fresno**  |
| **Course Number:** 77488 | **Instructor**: Dr. Emily Walter (she/hers) |
| **Units:** 3 | **Office**: I am teaching remotely in Fall 2021, please use email. |
| **Day & Time:** M 7:00-9:50 PM Pacific | **E-Mail** (preferred):ewalter@csufresno.edu |
| **Location:** Virtual Synchronous Course on ZoomMeeting ID: 817 1319 5606Passcode: 866539 | **Telephone:**  I am teaching remotely in Fall 2021, please use email. |
| **Website**:To access the course login to Canvas using your Fresno State username and password | **Office Hours:** Mondays 12-1 PM and Thursdays 2-3 PM Pacific @Meeting ID: 958 2657 2930Passcode: biology10 |

Table of Contents

[Textbooks and Materials 5](#_Toc80446609)

[Required Books 5](#_Toc80446610)

[Required Materials 5](#_Toc80446611)

[Grading Scale 5](#_Toc80446612)

[Course Policies 6](#_Toc80446613)

[Checking Email and Canvas 6](#_Toc80446614)

[Contacting Dr. Walter 6](#_Toc80446615)

[Late Assignment Policy 6](#_Toc80446616)

[Attendance Policy 6](#_Toc80446617)

[Extra Credit Policy 7](#_Toc80446618)

[Policy on Plagiarism and Plagiarism Detection 7](#_Toc80446619)

[Writing Style Requirements 7](#_Toc80446620)

[Support for Student Parents 8](#_Toc80446621)

[Perusall Expectations 8](#_Toc80446622)

[University Policies 9](#_Toc80446623)

[Policy on Students with Disabilities 9](#_Toc80446624)

[The University Honor Code 9](#_Toc80446625)

[University Policy on Cheating and Plagiarism 10](#_Toc80446626)

[Computers 10](#_Toc80446627)

[Disruptive Classroom Behavior 10](#_Toc80446628)

[Copyright Policy 11](#_Toc80446629)

[Family Educational Rights and Privacy Act (FERPA) 11](#_Toc80446630)

[Tentative Course Schedule 12](#_Toc80446631)

[Assignments and Grading 14](#_Toc80446632)

[In-Class Participation 14](#_Toc80446633)

[Perusall Annotations 14](#_Toc80446634)

[Weekly Exit Tickets 14](#_Toc80446635)

[Analysis of an Account of Science: 14](#_Toc80446636)

[Science Communication Project: 14](#_Toc80446637)

[Project Reflection 14](#_Toc80446638)

[Total Points 14](#_Toc80446639)

[In Class Discussion Participation Guide 15](#_Toc80446640)

[Benefits of Discussion 15](#_Toc80446641)

[Discussion Dispositions 15](#_Toc80446642)

[Student Responsibilities 16](#_Toc80446643)

[Discussion Self-Evaluation 17](#_Toc80446644)

[Syllabus Signature Page 18](#_Toc80446645)

# Health and Safety

***The following sections regarding COVID are subject to change***

***given changing circumstances on-campus and in the community.***

 ***Please check the COVID website for the most up-to-date information at:***

 [***www.fresnostate.edu/coronavirus***](http://www.fresnostate.edu/coronavirus)

**Vaccination:  In order to create a safe environment on campus, all students must be vaccinated against the SARS-CoV-02 virus, or obtain an exemption, in order to attend classes on campus or access any services on campus. Documentation of the first dose of the vaccination must be uploaded to the student portal by Aug 20, and documentation of the final dose by Sept 30.** Students may request an exemption to the vaccine requirement by going to their student portal to complete the COVID self-certification. Students with vaccination exemptions are subject to weekly COVID testing. You are not allowed to come to campus if any of the following is true:

* You have not been vaccinated, and have not been granted an exemption, or
* You have been granted an exemption, but have not completed your required weekly testing.

**Health Screening:** Students who come to campus and/or are participating in off-campus in-person experiential learning will be required to complete a [daily health screening](https://fresnostate.co1.qualtrics.com/jfe/form/SV_5n0jKg9SGdJcrGd) before coming to campus or learning site. You are not allowed to come to campus if any of the following is true:

* If you are experiencing COVID-19 symptoms (vaccinated or not).
* If you have tested positive within the past 10 days.

If you have a suspected or confirmed case of COVID-19, please complete the campus [online reporting form](https://fresnostate.co1.qualtrics.com/jfe/form/SV_3faIAsuC8CzuFjD?Q_FormSessionID=FS_UFJ902LXgDJbKeZ).  A campus official will reply to provide guidance and information.

**Safety Measures:** Face coverings are required to be worn indoors on-campus and during in-person classes (vaccinated or not), and/or in accordance with learning site requirements if participating in off-campus experiential learning, to reduce the risk of community spread of COVID-19. The [Student Health and Counseling Center](http://www.fresnostate.edu/studentaffairs/health/index.html) has complimentary masks available for students who need them.  The mask requirement may be modified if/when transmission rates in Fresno Country drop below the threshold identified by the CDC.

**Student Conduct:** Please remember that the same student conduct rules for in-person classroom instruction also apply for virtual/online classrooms. Students are prohibited from any unauthorized recording, dissemination, or publication of any academic presentation, including any online classroom instruction, for any commercial purpose.  In addition, students may not record or use virtual/online instruction in any manner that would violate copyright laws.  Students are to use all online/virtual instruction exclusively for the educational purpose of the online class in which the instruction is being provided.  Students may not record any online recordings or post any online recordings on any other format (e.g., electronic, video, social media, audio recording, web page, internet, hard paper copy, etc.) for any purpose without the explicit written permission of the faculty member providing the instruction.  Exceptions for disability-related accommodations will be addressed by Student Disability Services working in conjunction with the student and faculty member.

# Course Description

Biology 270T is a course is designed for graduate students in the sciences. Scientists, science teachers, and science communicators agree that science is an important way of explaining the natural world. When we communicate and teach science, we talk about science as both a set of practices and an historical accumulation of knowledge. An essential part of science education is learning science and engineering practices and developing knowledge of the concepts that are foundational to science disciplines. Further, students should develop an understanding of the enterprise of science as a whole—the wondering, investigating, questioning, data collecting and analyzing.

This course presents perspectives, a rationale, and research supporting an emphasis on the nature of science in the context of the biological sciences.

# Learning Goals

By the end of this course, I expect that you will understand the following eight principles of science, including how each is explained through perspectives of major philosophers. You will use these guiding principles and philosophies by examining a first-hand or second-hand account of science in detail. As you analyze this account, you will breaking down histories by identifying motives and causes, making inferences, and finding evidence to support generalizations about how science works. The book you choose should be a “hidden figure” of science -- a person from a group historically marginalized from the scientific discipline.

**By the end of this course, I expect that you will:**

* Understand various philosophical positions with regard to the nature of science
* Clarify and refine your own views of the nature of science
* Consider the roles of society, culture, and gender in creating science knowledge
* Explore science through perspectives of women, people of color, and other historically marginalized groups
* Be aware of commonly held ideas about the nature of science among the general public
* Identify implications of perspectives of the nature of science for science communication

By the end of the course, you are expected to create a product to communicate how your discipline of science (a) embodies the central principles of science and (b) explore how your pursuits in science connect to the history and philosophy of science. **The guiding principles of science as illustrated in this course include:**

## Scientific Investigations Use a Variety of Methods

## Scientific Knowledge is based on Empirical Evidence

## Scientific Knowledge is Open to Revision in Light of New Evidence

## Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

## Science is a Way of Knowing, but not the Only Way of Knowing

## Scientific Knowledge Assumes an Order and Consistency in Natural Systems

## Science is a Human Endeavor

## Science Addresses Questions about the Natural and Material World

# Textbooks and Materials

## Required Books

* Chalmers, A. F. (2013). *What is this thing called Science? 4th Ed.* Hackett Publishing.
* Patton, M. F., & Cannon, K. (2015). *The Cartoon Introduction to Philosophy.* New York: Strauss and Giroux.

## Required Materials

* Notebook paper
* Pencils and Pens
* A set of markers, colored pens, or colored pencils
* An electronic device (computer, tablet, or smart phone; computer preferred)

# Grading Scale

A ≥ 90% C = 70 – 79.99999%

B = 80 – 89.99999% D = 60 – 69.99999% F = 0 – 59.9999%

# Course Policies

When in our class, I expect you to be engaged and participating actively. This means that email, texting, homework for other classes, Facebook, YouTube, and online shopping can wait. Leaving the computer should be reserved for scheduled breaks and emergencies only. I expect you to be on your computer and engaged with class. If this becomes a problem, I may ask you to leave the Zoom OR I may remove you from the Zoom meeting.

## Checking Email and Canvas

You are expected to please check your Fresno State email daily and pay attention to the available materials on Canvas, including readings, videos, and the grade book. The only way I have to communicate with you is using these electronic means. Please be diligent in staying connected.

## **Contacting Dr. Walter**

Email is the best way to reach me. I usually respond to emails within 48 hours. However, if I am busy or out of town, it may take me longer to respond. Please use proper letter etiquette and spelling when emailing me (or any professor). Include our course name (BIOL 270T) in your email subject line for a faster response. I prefer to be addressed by Dr. Walter or Professor Walter, not by the generic “Professor” or by my first name.

## **Late Assignment Policy**

Late assignments will be deducted 10% (one letter grade) for every 24 hours late.

This period begins immediately after an assignment is due. This means that if the assignment is due at 11:59 PM and a student submits the assignment at 12:00 AM, the assignment is late and assignment will be deducted 10%.

Do not let a computer crash or lack of Internet cause your assignments to be late! Please back up your work on the cloud. Be prepared to act on your feet should technical difficulties arise.

## **Attendance Policy**

Students are expected to attend all scheduled class sessions. However, due to circumstances beyond your control (ex: illness) or within your control (ex: out of town trip) you may have to be absent during the semester at some point. I recommend that your absences should be used only for circumstances beyond your control. All students are allotted two absences (regardless of the reason) without penalty. **Your final course grade will be lowered by 5% if you miss more than 2 classes. This could potentially affect your final letter grade.**

As a courtesy to your classmates and me, you need to let me (Dr. Walter) know when you will be out of class so that accommodations in group structure and related plans can be made. If absent, it is your responsibility to ensure any assignments due are turned in, and to find out what tasks you need to complete. Please note that given the hands-on nature of our course, many in-class activities cannot be "made up."

## **Extra Credit Policy**

At this time, I do not plan to offer extra credit for this course.

## **Policy on Plagiarism and Plagiarism Detection**

The campus subscribes to Turn-it-in and the SafeAssign plagiarism prevention service through Canvas, and you will need to submit written assignments to Turn-it-in/SafeAssign. Your work will be used for plagiarism detection and for no other purpose. You may indicate in writing that you refuse to participate in the plagiarism detection process, in which case I can use other electronic means to verify the originality of your work.  Turn-it-in and/or SafeAssign Originality Reports**will be available** for your viewing upon request.

Assignments that have documented plagiarism will receive no more than 50% of the original points available. I reserve the right to decide the penalty for the infraction in line with the [University Policies on Academic Dishonesty.](http://www.fresnostate.edu/academics/facultyaffairs/documents/apm/235.pdf) A student cannot redo the plagiarized assignment, I will only accept the original assignment as submitted.

Please note -- I am required by the University to report all cases of academic dishonesty and plagiarism.

## Writing Style Requirements

All assignments should be written in accordance with APA style (7th Ed.). A full explanation of APA style can be found at: <https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html>

Some APA highlights that you should particularly pay close attention to:

* Reference citations in text
* Reference list requirements
* Levels of headings
* Running head and page numbers
* Quotations

Like APA, I prefer that you write your papers in first person, APA style also suggests using an “active voice” in writing rather than a “passive voice.” Again, I concur and prefer that you write your papers in “active voice.” In other words, avoid constructions where the subject is not present (the test was administered), and replace with an active subject (I administered the test).

## **Support for Student Parents**

Should you have difficulty with obtaining childcare on a given day, *you are welcome to bring your child with you to virtual class.* I trust you to know whether you could successfully have your child near you during class, and it will not bother me if you have little people nearby. From my perspective, your child is welcome to be around during class time. They can attend class and (a) participate or (b) do other activities, such as read, watch videos (with headphones), play video games, color, etc.

**If you are breastfeeding and need to step out for a period longer than our planned 10-minute break, please feel free to do so.**  Should you miss class time based on this need, we will work on finding a way to summarize what went on during your absence. **If there is anything else I can do to support you as a parent, please let me know.**

# Perusall Expectations

This semester, we are using a tool called *Perusall.* This free online application helps you master readings faster, understand the material better, and get more out of the course. To achieve this goal, you will be collaboratively annotating the readings with others in the course.

Research shows that by annotating thoughtfully, you’ll learn more; so here’s what “annotating thoughtfully” means: Effective annotations deeply engage points in the readings, stimulate discussion, offer informative questions or comments, and help others by addressing their questions or confusions. Your annotations are evaluated on the basis of 4 criteria: **quality**, **timeliness**, **quantity**, and **distribution**:

|  |  |
| --- | --- |
| **Overall Evaluation** | **You will receive an overall evaluation for each reading assignment:** 2 = meets expectations, 1 = needs improvement, 0 = insufficient. These scores are based on the four criteria below. |
| 1. Quality of Annotations | Each of your annotations (comments) is automatically assigned one of the following evaluations:2 = Demonstrates thorough, thoughtful reading AND insightful interpretation 1 = Demonstrates reading, but no (or only superficial) interpretation of the reading0 = Does not demonstrate thoughtful reading or interpretation |
| 2. Timeliness | 1 = on time, 0 = not on time* Our conversations in class depend on you having done the reading in advance, so completing the reading and posting your annotations before the posted deadline (Mondays at 9 PM) is required to receive credit.
* To encourage discourse, there is a 3-day reply window after each posted deadline during which you can continue to reply, for full credit, to questions posted by others.
	+ The number of additional overall points you can earn during the post-deadline reply window is capped at the credit you can receive before the deadline.
 |
| 3. Quantity | You need **3** High-quality annotations per reading (unless otherwise noted)* *Persuall* will compute your overall score using your 3 highest-quality annotations for each reading, so be sure to write at least this number (*Note.* Shorter readings will have fewer required annotations).
* Because I want you to engage in a natural conversation with your classmates through your annotations, your overall score only depends only on the highest-quality annotations.
* So, as long as you have 3 high quality annotations, a brief response to another student (e.g., answering “Yes” to what is just a yes or no question), low-quality annotations won’t hurt your overall score.
 |
| 4. Distribution | Distribute your annotations throughout the text.* To lay the foundation for understanding the in-class activities, you must at least familiarize yourself with each assignment in its entirety.
* Annotating only part of the text and/or failing to distribute your annotations throughout the document lowers your overall score.
 |

# University Policies

## **Policy on Students with Disabilities**

If you need accommodations because of a disability, you have emergency medical information to share with me, or you need special arrangements in case the building must be evacuated, **please inform me as soon as possible.** Please see me privately after class or at my office.

Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in Henry Madden Library, Room 1202, (559) 278-2811.

## **The University Honor Code**

Members of the Fresno State academic community adhere to principles of academic integrity and mutual respect while engaged in university work and related activities. You should:

1. Understand or seek clarification about expectations for academic integrity in this course (including no cheating, plagiarism and inappropriate collaboration)
2. Neither give nor receive unauthorized aid on examinations or other course work that is used by the instructor as the basis of grading.
3. Take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

I may require you to sign a statement at the end of all exams and assignments that “I have done my own work and have neither given nor received unauthorized assistance on this work.”

## **University Policy on Cheating and Plagiarism**

Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work.

Penalties for cheating and plagiarism range from a zero or F on a particular assignment, an F for the course, to expulsion from the university. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

## **Computers**

At California State University, Fresno, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have their own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services or the [University Bookstore](http://www.kennelbookstore.com/SiteText.aspx?id=20666). In the curriculum and class assignments, students are presumed to have 24-hour access to a computer and the necessary communication links to the University's information resources.

## **Disruptive Classroom Behavior**

The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. Differences of viewpoint or concerns should be expressed in terms that are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop an understanding of the community in which they live. Student conduct that disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.

## **Copyright Policy**

Copyright laws and fair use policies protect the rights of those who have produced the material. The copy in this course has been provided for private study, scholarship, or research. Other uses may require permission from the copyright holder. The user of this work is responsible for adhering to copyright law of the U.S. (Title 17, U.S. Code). To help you familiarize yourself with copyright and fair use policies, the University encourages you to visit its Copyright Web Page (http://libguides.csufresno.edu/copyright).

Technology Innovations for Learning & Teaching (TILT) course web sites contain material protected by copyrights held by the instructor, other individuals or institutions. Such material is used for educational purposes in accord with copyright law and/or with permission given by the owners of the original material.

You may download one copy of course materials on any single computer for non-commercial, personal, or educational purposes only, provided that you (1) do not modify it, (2) use it only for the duration of this course, and (3) include both this notice and any copyright notice originally included with the material.

***Beyond this use, no material from the course web site may be copied, reproduced, re-published, uploaded, posted, transmitted, or distributed in any way without the permission of the original copyright holder.*** The instructor assumes no responsibility for individuals who improperly use copyrighted material placed on the web site.

## **Family Educational Rights and Privacy Act (FERPA)**

Federal law (FERPA) strictly prevents me from discussing your grades or class performance with your parents (or anyone else) without your permission. If you DO want me to discuss your performance with them or anyone else, you must complete and sign a document waiving privacy rights. Federal law does not make an exception because your parents are paying for your education. If there is a question about your grades, please come see me yourself; you are the only one with whom I can discuss your class performance.

# Tentative Course Schedule

**Fall 2021**

The schedule and procedures for this course are ***subject to change*** to remain responsive to the general pace of the course, address your learning needs, and for extenuating circumstances.

| **Date** | **Topics** | **Readings to Annotate**(Perusall annotations due by email by 11:59 PM Sunday before class; \*= Read in Hard Copy, No Annotations on Perusall) | **Assignments** |
| --- | --- | --- | --- |
| **Theme 1: What is the Nature of Science? Why Does it Matter?** |
| *Week 1*Aug 23 | Course IntroductionYour views on the nature of science | * No Readings Due Before Class
 | Post on FlipGrid;Gather Course Supplies |
| *Week 2*Aug 30 | What is the ‘nature of science’ and why is it important to understand? | * *Cartoon Intro to Philosophy,* Ch. 1 and 2\*
* *Young People’s Images of Science*; Ch. 2
* Keys to Teaching Nature of Science (McComas, 2004)
 | Select your account of science book, submit details on Google Form |
| MondaySept 6 | No Class – Labor Day |  |  |
| *Week 3*Sept 13 | What is Reality?Observation; Subjectivity;Empiricism & Positivism | * Chapters 1 and 2; Chalmers (2013)
* *Cartoon Intro to Philosophy*; Ch. 3
 |  |
| *Week 4*Sept 20 | Scientific Method | * Chapter 3; Chalmers (2013)
* Howitt & Wilson (2014)
* Medawar (1990) -- *optional*
 |  |
| *Week 5*Sept 27 | Theory, Law, and Hypothesis; The problem of induction | * Chapters 4 & 14; Chalmers (2013)
* Carey, Chapter 3
* Medawar (1982) *Pluto’s Republic*
 | Bring examples of theories, laws, and hypotheses you know from science |
| *Week 6*Oct 4 | “Proof” in Science and Falsificationism | * Chapters 5-7; Chalmers (2013)
 |  |
| *Week 7* Oct 11 | Progress in ScienceKuhn’s “Paradigms” Lakatos’ “Research programmes” | * Chapter 10; Chalmers (2013)
* Horgan, J. (1996).
 |  |
| *Week 8* Oct 18 | Theme 1 Review & Wrap Up; Peer Review of Analysis Papers | * No Readings this Week
 | **Book Analysis Paper Draft Due** |
| **Theme 2: The Nature of Scientific Knowledge / Sociology of Science** |
| *Week 9*Oct 25 | Introduction to the Sociology of Science | * Merton, R. (1973).
* Knorr-Cetina, K. D. (1983).
 |  |
| *Week 10* Nov 1 | Science, Culture, and Hidden Figures of Biology | * McGee & Bentley (2017)
 | **Book Analysis Paper Due** |
| *Week 11* Nov 8 | Science and Gender | * Des Jardins (2010), Part 1
* Des Jardins (2010), Part 2
 |  |
| **Theme 3. The Nature of Science, Science Communication, and Science Denial** |
| *Week 12* Nov 15 | Evolution and the Nature of Science | * *Cartoon Intro to Philosophy*; Chapter 8\*
* *Science, Evolution and Creationism* (eBook)
* Barnes et al. (2017)
 |  |
| *Week 13* Nov 22 | Communicating the Nature of Science | * Nielson (2013)
 |  |
| *Week 14* Nov 29 | Science Denial, Logic, and Nature of Science | * Cranky Uncle versus Climate Change (eBook)\*
 |  |
| *Week 15* Dec 6 | Course Wrap Up; Project Draft Feedback | No Readings this Week, Work on your Projects | Bring Draft of Final Project |
| **Finals Week** | **Days** | **Dates** |
| Faculty Consultation Days | Thursday and Friday  | December 9 – 10 |
| Final Semester Project Symposium + Course Wrap Up | Monday | December 13 from 8-10 PM |
| Final Project File Upload and Reflection Due  | Monday | December 13 by 11:59 PM |

# Assignments and Grading

|  |  |  |  |
| --- | --- | --- | --- |
| **Assignment** | **Due Date** | **% of Grade** | **Points** |
| **Weekly and On-Going Activities (35%)** |
| In-Class Participation: This course is highly interactive and will require your active and thoughtful participation. You will self-assess your grade for in-class participation at the end of the course.  | N/A | 15% | 150 |
| Perusall Annotations. Reading and annotating outside of class is an important part of this course. *Perusall* maintains a log of your progress and provides a forum for you to ask Q to one another outside of class. | Weekly by Sunday at 11:59 PM | 5% | 50 |
| Weekly Exit Tickets: Our weekly exit tickets are short multiple-choice and short answer assignments to help me check in on your learning. These will be administered over Google Docs and are graded on thoughtful completion. We will have 15 class periods, so each exit ticket is worth 10 points. Please submit your exit ticket for each week of class by 11:59 PM Pacific on Wednesday. | Weekly by Wed at 11:59 PM | 15% | 150 |
| **Major Projects (65%)**  |  |
| Analysis of an Account of Science: Abstract ideas, such as the ones we will be discussing in this course, can often be clarified through examples. For this assignment you will read a book, an account of the scientific enterprise. Ideally, this should be a story of a “hidden figure” of science, any person from science that is a member of a historically marginalized group. You will compare the text to course ideas, making connections, finding examples, and discovering discrepancies. Papers will be peer-reviewed. A suggested bibliography is provided on Canvas. | Oct 21 (draft)Nov 6 (final) | 30% | 300 |
| Science Communication Project: You will craft a presentation, podcast, unit for part of a college science course, dramatic interpretation, or other product to *tell the story of a historic figure in science from your book.* Your product should communicate at least 3 major aspects of how science works and be historically accurate in telling the story of the scientist(s) you share about.  | Dec 13 | 30% | 300 |
| Project Reflection: You will write a written reflection on the major ideas you learned in the course and what you feel you gained as a scientist through doing the science communication project. | Dec 13 | 5% | 50 |
| Total Points |  | **100%** | **1000** |

# In Class Discussion Participation Guide

## Benefits of Discussion

Our success in this course depends on the degree to which we can establish a discourse community committed to ideals of democratic discussion. Brookfield and Preskill (1999) delineate the potential benefits of discussions:

1. Helping students explore a diversity of perspectives.
2. Increasing students' awareness of and tolerance for ambiguity or complexity.
3. Helping students recognize and investigate their assumptions.
4. Encouraging attentive, respectful listening.
5. Developing new appreciation for continuing differences.
6. Increasing intellectual agility.
7. Helping students become connected to a topic.
8. Showing respect for students' voices and experiences.
9. Helping students learn the processes and habits of democratic discourse.
10. Affirming students as co-creators of knowledge.
11. Developing the capacity for the clear communication of ideas and meaning.
12. Developing habits of collaborative learning.
13. Increasing breadth and making students more empathic.
14. Helping students develop skills of synthesis and integration.
15. Leading to social change.

## Discussion Dispositions

Yet for these benefits to accrue, lively interactions among critically conversing participants are essential. This is where your responsibility as a class participant comes to bear. Brookfield and Preskill (1999) describe the dispositions that students and teachers need to practice in order for discussions to be successful.

1. **Hospitality**: We will try to establish an atmosphere in which people feel invited to participate. Hospitality implies a mutual receptivity to new ideas and perspectives, and a willingness to question even the most widely accepted assumptions. We must balance seriousness of purpose with lightness of tone, and employ self-deprecating humor when the tension becomes too great.
2. **Participation**: Discussions work best when a large number of class members participate on a variety of occasions about a variety of topics, contributing depth and subtlety to the discussion. Many of us need to feel efficacious about our participation--that our participation matters and is having an impact on others.
3. **Mindfulness**: Paying close attention to the words of others, although difficult, is critical to successful discussions. We need to try to pay attention to the whole conversation--to who has spoken and who has not, to what has been said and not said--and defer to those who have not yet spoken. Another component of mindfulness is tact, not compromising our principles, but checking our desire to express ourselves fully and vociferously in light of the whole conversation.
4. **Humility**: We must demonstrate the willingness to admit that our knowledge and experience are limited and incomplete. We must acknowledge that others in the group have ideas to express that might teach us something or change our minds about something. Humility also implies the inclination to admit errors in judgment.
5. **Mutuality**: It is in the interest of us all to care as much about each other's self-development as about our own. We must realize that our own growth depends in a vital sense on the growth of all others. Such a spirit will generate goodwill, generosity, and trust among participants. We become more willing to take risks and speak frankly when we know our actions are likely to be seen as mutually beneficial. Mutuality also implies that each of us must be willing to alternative between the roles of teacher and student in our participation.
6. **Deliberation**: We must be willing to discuss issues as fully as possible by offering arguments and counter-arguments that are supported by evidence, data, and logic and by holding strongly to these unless there are good reasons not to do so. We must express our views forcibly, though civilly. Consensus will not always be our goal; sometimes it may be just as desirable if deliberation results in continuing differences' being better understood and more readily tolerated. Deliberation also involves an evaluation of how effectively the problem has been resolved.
7. **Appreciation**: We need to find space and time to express our appreciation to one another. When a helpful comment clarifies a key point, or an intriguing comment excites further discussion, we should express our gratitude openly and honestly. Such expressions of gratitude can appear overdone and seem sentimentalized, so we must take care to be authentic in our appreciation.
8. **Hope**: The main reason for any dialogue is the hope of reaching new understanding. Hope sustains us through the complexity and provides us with the sense that our time and efforts are worth it. Hope implies what Dewey called "democratic faith," that pooling the talents and abilities of individuals increases the likelihood that new light will be shed on understanding.
9. **Autonomy**: Participants who retain the courage, strength, and resolve to hold to an opinion not widely shared by others should be given their due. We should honor autonomy as a temporary state where an individual can claim his/her beliefs; yet that same individual should be willing to subject those beliefs to continuous reevaluation and possible revision.

*Note*. This discussion guide has borrowed heavily from the language in:

Brookfield, S. D., & Preskill, S. (1999). *Discussion as a way of teaching: Tools and techniques for democratic classrooms*. San Francisco, CA: Jossey-Bass.

## Student Responsibilities

As a member of this class, you are responsible for developing these nine dispositions throughout the course. I do not think we can take these dispositions lightly. They will be difficult to achieve in practice and will take constant personal attention. However, if each of us is committed to the ideals these dispositions represent, and to our own professional growth, we will make progress toward productive discussions.

Secondly, you are responsible for coming to class prepared. Preparation includes reading, writing, and thinking about the issues at hand prior to class. If our discussions are to be deliberative and mutual, we must have a shared basis for discussion, along with the personal knowledge and experience we bring to bear. Your final responsibility will to evaluate your contributions to the discussion by completing a self-evaluation (see below) at mid term and at the end of the semester.

# Discussion Self-Evaluation

**Name ­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_**

***Please read each statement and evaluate yourself using the following scale:***

***(4=almost always, 3=often, 2=sometimes, 1=seldom or never)***

**Preparation for Discussion**

* I read the assigned readings thoroughly for each week. \_\_\_\_\_
* I prepared for the discussion by highlighting, outlining,

 concept mapping, or some other technique. \_\_\_\_\_

* I noted questions and reactions I had about the readings, and

responded thoughtfully to reading response assignments. \_\_\_\_\_

**Large Group Discussion**

* I practiced hospitality by inviting all perspectives. \_\_\_\_\_
* I communicated my insights and opinions. \_\_\_\_\_
* I listened to the ideas of others. \_\_\_\_\_
* I stayed focused on the topic under discussion. \_\_\_\_\_
* I acknowledged the limits of my thinking. \_\_\_\_\_
* I practiced mutuality between the roles of teacher and student. \_\_\_\_\_
* I offered evidence and logic in support of my views. \_\_\_\_\_
* I explicitly appreciated the contributions of others. \_\_\_\_\_

**Small Group Discussion**

* I offered my ideas. \_\_\_\_\_
* I listened to the ideas of others. \_\_\_\_\_
* I took notes. \_\_\_\_\_
* I represented my group as spokesperson. \_\_\_\_\_

TOTAL SCORE \_\_\_\_\_

***Please comment on your strengths and weaknesses with regard to class discussions:***

# Syllabus Signature Page

California State University – Fresno

(to be shared over Google Forms)

Instructor: Dr. Emily Walter

Course: BIOL 270T. History and Philosophy of Science

Semester: Fall 2021

I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, agree that I received a copy of the course

syllabus for the class mentioned above. I understand the course requirements and that I

am expected to attend all class meetings and events. **I understand that if I miss more than**

**two class sessions that my grade will be reduced by 5%.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Print Full Name

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature Date