POINT LOMA NAZARENE UNIVERSITY

Biology Department

BIO 6033 History & Philosophy of Science (3 units)

Fall 2019

Meeting days: Mostly online with 5 in-person meetings on Wednesday evenings	**Instructor title and name:** Dianne L. Anderson, PhD
Meeting times: 5:30-8:00 PM	**Phone:** 619-849-2705
Meeting location: Latter 2, Main Campus	**E-mail:** dianneanderson@pointloma.edu
Final Exam: Dec. 18, 2019	**Office location and hours:** Rohr Science 146

PLNU Mission
To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

COURSE DESCRIPTION

This course involves discussion of seminal works in the history and philosophy of science to explore both historical ways of thinking and philosophical ways of thinking. From this perspective, the course explores current interest in the nature of science as an integral part of the study of science. Predominantly on-line course delivery.

COURSE LEARNING OUTCOMES

1. Compare and contrast the differences in scientific thought and processes before and after the scientific revolution.
2. Describe the impact of technological innovations on scientific discovery throughout history.
3. Analyze significant readings in the history and philosophy of science to identify key points.
4. Explain how the nature of science has changed over time, and describe how this is important.
5. Distinguish between science and faith/religion, and discuss the potential compatibility of the two domains. (PLO#4)*
6. Trace the development of scientific ideas in various subject areas, and in various parts of the world.
7. Distinguish between research in biology and research in history of biology in terms of purpose, methods, and types of evidence.

**PLO#5 is assessed in this course using the following Signature assignment:*

a. *In a 200-300 word essay, distinguish between* the types of questions science can answer and the types of questions faith/religion can answer.

b. *In a 200-300 word essay, discuss the potential compatibility of these two domains within the context of explanations for the diversity of life on earth.*

You will have several opportunities during this course to think about and to discuss the relationship between science and faith, as well as how this relationship impacts your everyday life, work, and relationships. Students in the class come from a variety of faith backgrounds and experiences, so we will spend time discussing why and how these issues are important in a respectful and hospitable manner. There is so much that we can learn from each other. My hope and prayer is that as you explore these ideas, you might closely examine and reflect on your own beliefs and practices.

Course credit hour information
It is expected that the completion of the reading, participation in discussions (online and in person), and writing required for this course will take approximately 150 hours (or approximately 10 hours per week), therefore, this class meets the PLNU credit hour policy for a 3-unit class.

Weeks	Each week's expectations	Total Hours
Weeks 1-4, 6-7, 8-10, and 12-13	6 hours reading, 2 hours DB or class discussion, 2 hours written assignment	10 hrs. x 11 weeks = 110
Weeks 5 and 11	8 hours preparing presentation, 2 hours in class	10 hrs. x 2 weeks = 20
Final project (week 14)	10 hours written and presentation of final project	10 hours
Final assignment & exam (week 15)	6 hours reading, 2 hours DB or class discussion, 2 hours written assignment	10 hours

Course readings
The readings for the course will come in three forms: books you purchase, book excerpts that will be available on Canvas, and readings that will be accessed through other websites.

Books to purchase for the course:

- Kuhn, Thomas, *The Structure of Scientific Revolutions*, 1962 (any edition is fine)
- DeWitt, Richard, *Worldviews: An Introduction to the History and Philosophy of Science*, 2nd Edition, 2010 (blue cover). John Wiley & Sons. ISBN 978-1-4051-9563-8 NOTE: A 3rd edition (pink/purple cover) came out in 2018, but the majority of the book is the same, and there are still many inexpensive used copies of the 2nd edition available, so purchase the 2nd edition.
- M.L. Gabriel & S. Fogel (Eds.), *Great Experiments in Biology*. 1955. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. No ISBN, out of print but used copies are available for under $20.

Use of technology

In order to be successful in the online environment, you'll need to meet the minimum technology and system requirements; please refer to the *Technology and System Requirements* information. Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

Course Requirements and Grading
Readings: You are expected to read the required texts in accordance with the course schedule, as well as every post on the Discussion Board (DB) during the week for which that DB is assigned.

Homework and discussion board assignments: Given that we meet together infrequently, this is primarily an online learning community. As such, an ongoing, engaged conversation in the discussion board area is critical to the success of our time together. You will receive up to 10 points each week for DB (or for participation in in-person discussion if applicable).

A typical weekly schedule will be as follows:
Wednesday – new assignment
Saturday at midnight - discussion board post in response to assignment
Monday at midnight – written assignment due
Tuesday at midnight - responses to 3 other students' posts (or an in-person meeting that week)
Students are allowed one week of non-participation for illness/family issues, etc. However, every effort must be made to attend the five in-person meetings since there are so few of them.

Each discussion board post to the original DB prompt(s) should be a minimum of 150 words in length and should providence evidence of (1) comprehension of some relevant portion of the reading material and (2) critical engagement with the material. Most weeks, you will not be able to see other students' posts until you respond to

the original prompt. Depending on the week, sometimes there will be specific discussion board prompts, and sometimes you will be encouraged to take the reflection into any relevant area that you find interesting.

In addition, you are expected to post responses to at least three other students' reflections on the reading every week. Each response should show comprehension of the reading material, and should engage the other student's reflection in a thoughtful and substantive manner. Responses are due by ***midnight on Tuesday*** and all responses will be evaluated the next day; however, discussion may continue past that point if sufficient interest is ongoing. The minimum requirement is three responses per week.

Summative assessments for the course: Pairs of students will prepare and present two 10-minute presentations that trace the development of scientific thought on two different topics. The first presentation will be on a topic relevant to the History of Medicine, and the second will be on the historical development of thought in one area of biology. Details about these presentations are available within the appropriate module. Each presentation is worth 50 points.

Near the end of the course, students will be expected to complete a final project that encompasses and draws from much of the material in the course. There are four options for the final; these choices are described in the Final Project module. Students are expected to provide a citation page with full bibliographic information for their sources as well as appropriate citations within the body of the paper (internal citations, footnotes, or endnotes) if necessary. Essays without appropriate grammar, structure, formatting, and citation, will receive a lowered grade. This assignment serves as the final exam for the course.

Late work: No late work will be accepted for either DB posts or written assignments. With respect to final project and the presentations, I will deal with extreme circumstances beyond the control of the student(s) on a case by case basis. In such cases, and depending on the circumstances, there may be a significant reduction in grade.

Grading:

Written assignments	10 points/week x 12 weeks = 120 points
Discussion Board posts/Class discussion	10 points/week x 12 weeks = 120 points
Presentations	50 points each x 2 = 100 points
Final project/exam	50 points
Total for course	**390 points**

Letter grades will be assigned as follows:

A- (90-91), A (92-100)
B- (80-81), B (82-87), B+ (88-89)
C- (70-71), C (72-77), C+ (78-79)
D- (60-61), D (62-67), D+ (68-69)
F Below 60

Note: There is often an assumption that something is wrong when a student receives less than a perfect score for an assignment. A perfect score is quite unusual, especially on large assignments, and means that there were no errors, and no suggestions for improvement could even be made. This is rarely the case.

Course schedule Fall 2019

Since the in-person meetings are all on Wednesdays and will be spent discussing the readings/assignments completed in the previous week, this will be out typical weekly schedule:

1. Thursdays are the start of the week – begin new assignments
2. First DB posts will be due by midnight on Saturdays
3. Written assignments and second DB posts will be due by midnight on Mondays
4. Assignments will be graded on Tuesdays
5. In-person discussions will be held Wednesdays (5 times during the semester)

Weeks with no in-person meeting will have discussion board assignments twice during the week. All details regarding readings and assignments can be found in the Canvas modules for each week.

Week	Date of in-person meetings (Wednesdays)	Topics
1 - Sept. 4		Introduction to course, Philosophy of Science, and scientific contributions from around the world
2 – Sept. 11	**Latter Hall, room 2**	**Philosophy of Science: Aristotle to Kepler** **The difference between faith/religion and science** **Panel discussion: theologian, philosopher, historian, scientist** **Role of "regular people" - artisans, sailors, craftspeople, etc.**
3 – Sept. 18		Philosophy of Science: Galileo to Newton
4 – Sept. 25		History of Medicine
5 – Oct. 2	**Latter Hall, room 2**	**History of Medicine presentations** **Guest Dr. Maria Zack?**
6 – Oct. 9		The very large and the very small
7 – Oct. 16		History of Biology: Photosynthesis
8 – Oct. 23	**Latter Hall, room 2**	**History of Biology: Genetics and Evolution**
9 – Oct. 30		History of Biology: Darwin
10 – Nov. 6		History of Biology: Molecular Biology
11 – Nov. 13	**Latter Hall, room 2**	**History of Biology presentations** **Class Discussion**
12 – Nov. 20		Philosophy of Science: Popper and Kuhn
Nov. 27		Thanksgiving week (small reading assignment only)
13 – Dec. 4		Philosophy of Science: The Structure of Scientific Revolutions
14 – Dec. 11	**Latter Hall, room 2**	**Final project**
15		Final exam History of Biology research

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned under extremely unusual circumstances.

FINAL EXAMINATION POLICY

Successful completion of this class requires taking the final examination **on its scheduled day**. No requests for early examinations or alternative days will be approved.

SPIRITUAL CARE

PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our graduate students to encounter God and grow in their Christian faith. At each campus location, we have an onsite chaplain who is available during class break times across the week. If you have questions, a desire to meet with the chaplain or prayer requests you can send an email to: gradchaplainmissionvalley@pointloma.edu

In addition there are resources for your Christian faith journey available at the Graduate & Professional Student Spiritual Life web page.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies in the Graduate and Professional Studies Catalog for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.
If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all classes are considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Graduate and Professional Studies Catalog for additional detail.