2019

An Evolving Interdisciplinary Honors Seminar on Science and Religion

Jospeh W. Shane

An Evolving Interdisciplinary Honors Seminar on Science and Religion

Joseph W. Shane
Shippensburg University

Abstract: The majority of this essay describes the content, pedagogy, and assessments associated with an undergraduate, interdisciplinary honors seminar on science and religion. The seminar is structured around five major themes: (a) philosophy of science, religion, and their interactions, (b) historical and contemporary case studies, (c) the controversy over biological evolution in the United States as a necessary case study, (d) comparative religion and science, and (e) contemporary issues at the intersection of science and religion. I also describe the consistency between the seminar and the mission of the honors college at my institution. Given the prominence of both science and religion in contemporary culture, I assert that such a course is engaging for students and faculty alike and provides opportunities for multidisciplinary involvement.

Keywords: religion, science, seminar, interdisciplinary

INTRODUCTION

Science and religion are two indisputably profound and durable cultural forces that have a complex history of interaction ranging from controversy and mutual suspicion to ongoing cooperation and accommodation. These interactions help to illuminate the revolutionary impact of Galileo, Newton, and Darwin as well as modern cosmology, quantum indeterminacy, and genetics. Teaching science within a social context, of course, is not a new idea, but much can be gained by paying specific attention to nuanced relationships between science and religion.

Among my university colleagues, conversations about science and religion tend to be limited to religious communities' responses—typically negative ones—to scientific theories such as evolution and geochronology as well as to epistemological distinctions—often tersely stated at the beginning of a course—between what is and is not empirical inquiry. Others assert that science and religion are implicitly at odds with one another or that they should simply be kept apart in the curriculum. Sociologist of religion Ecklund (2010) called these "no God on the quad" approaches in a study of academic scientists' religious beliefs.

The story, however, contains much more that is worthy of addressing in higher education and, in particular, within honors programs given their accomplished students and commitments to interdisciplinary work. Thorough understanding of science-religion interactions requires elements of philosophy, theology, and comparative religion in addition to history and to working understandings of contemporary natural and social sciences. Such an undertaking is ideal for an upper-division honors seminar where students are expected to assume responsibility for guiding class discussions and suggesting course content. Beyond resources that address aspects of evolution (e.g., James and Bruce 2009; Lam 2012), though, similar courses do not currently appear in the National Collegiate Honors Council (NCHC) archives.

Beginning with the origins of the honors seminar at my institution, the present essay then outlines the topics, lessons, and assessments from the most recent iteration. The course syllabus is attached as an appendix. I conclude with future directions and recommendations for colleagues who are considering a science-religion course but who might have reservations about their own qualifications as well as how the course would be received by students, faculty, administration, and surrounding communities.

BACKGROUND AND CONSISTENCY WITH HONORS COLLEGE GOALS

My personal interest in science and religion began in 2005 with the *Kitzmiller v. Dover Area School Board* trial (National Center for Science Education 2018), which centered on a school district and community approximately forty-five miles from my campus. In brief, Judge John E. Jones, III, ruled as unconstitutional due to its religious nature a statement approved by the school board advocating a non-scientific alternative to evolution called intelligent design. The ruling itself is compelling (the formal judicial reference is 400 F.Supp.2d 707, M.D. Pa. 2005), but it prompted me to read more about the history of opposition to evolution and other scientific theories in, for example, Larson's (1998) history of the Scopes' trial, Numbers' (2006) history of creationism, and Marsden's (2006) descriptions of the ongoing legacy of early twentieth-century Christian Fundamentalism with its dedication to removing evolution from public school instruction.

I soon discovered the work of Ian Barbour (1923–2013), who is generally credited with establishing science-religion relationships as an historical subdiscipline. His seminal text, *Religion and Science: Historical and Contemporary Issues* (1997), broadened my thinking and prompted my giving presentations at professional conferences for science teachers and teaching short courses at regional churches and public libraries. Eventually, the director of the Wood Honors College (Shippensburg University 2018) approached me to design an interdisciplinary seminar structured on the following student learning outcomes:

- Apply the tools (methodologies/content/skills) of multiple disciplines to analyze and/or solve complex issues and problems.
- Work collaboratively with persons from different fields of specialization (in diverse, cross-disciplinary teams) to analyze and/or solve applied, real-world issues and problems.
- Appreciate the importance of civic responsibility and demonstrate informed and engaged civic responsibility by having participated regularly in community service and/or service learning projects.

The course, Introduction to the Historical Interactions Between Science and Religion, is well-suited for these broad goals. The curriculum is by its nature interdisciplinary, and I capitalize on students' diverse fields, interests,

and experiences. The course also contributes to students' civic responsibility in that they better understand how to view science and technology in a religiously plural world.

COURSE DESCRIPTION: RESOURCES, TOPICS, SEQUENCE, LESSONS, AND ASSESSMENTS

The fifteen-week course meets twice a week for seventy-five minutes and is capped at twenty-five students. Barbour (1997) is our primary text, which I supplement with chapters from *The Oxford Handbook on Religion and Science* (Clayton and Simpson 2006), articles from *Zygon: Journal of Religion and Science* <http://www.zygonjournal.org>, audio-recorded lectures (e.g., Larson 2002; Principe 2006), and various podcasts and video recordings of lectures, debates, and panel discussions accessible through the internet.

In addition to serving as a resource repository, our online learning management system allows students to post questions and participate in small-group discussions. The focus is, however, on in-class discussion. Many of the lessons described below follow a similar pattern: readings assigned to separate, small groups that are conducted in seminar-style discussions. I often provide class time for group members to organize their information, and in other cases a group leader assembles outlines or electronic slides ahead of time.

The next five sections describe the major topics from the most recent iteration of the honors seminar with additional resources and lesson details as appropriate.

Philosophy of Science, Religion, and Their Interactions: Building on Ian Barbour's Legacy

I begin the course by having students write an initial draft of a personal statement about science and religion where they address the following questions and prompts:

- What is science? (alternatively, what concepts and ideas do you associate with science?)
- What is religion? (similarly, what concepts and ideas do you associate with religion?)
- In what ways might science and religion complement one another?

- In what ways might science and religion be in conflict with one another?
- In what ways might science and religion be irreconcilable in that they neither assist nor detract from one another?
- Describe any specific contemporary or historical events that you are aware of where science and religion have interacted.
- Pose any questions or concerns you have about science, religion, and their interactions.
- (Optional) Describe any personal experiences you have had with respect to science and religion.

During the first week, students participate in an online chat room and cooperative class discussions about these topics that they find most compelling as they read chapters from Part II of Barbour (1997) addressing philosophy of science and religion and outlining Barbour's four-part framework for science-religion interactions: warfare or conflict, independence, integration, and dialogue. With respect to science, we discuss the nature of scientific theories and models as well as how science often progresses in a non-linear manner via paradigm shifts commonly referred to as scientific revolutions. Students are encouraged to include examples from their own fields such as atomic theory, evolution, Newtonian mechanics, astronomy, and the nature of human intelligence.

As for common characteristics of religion, students consider the centrality of religious experience (e.g., an omnipresent creator, understanding of suffering, moral obligations) as well as faith communities' accepted stories and rituals derived from sacred texts and oral traditions. Experience, story, and ritual are the data of religion according to Barbour although these data are not empirically testable and generalizable in the same manner as science. As with science, students are encouraged to give examples from their previous experiences which, not surprisingly in central Pennsylvania, tend to be derived from various Christian traditions.

Having defined some basic terms, we turn our attention to ways of relating science and religion. Barbour's warfare or conflict position suggests that science and religion are philosophically and/or methodologically opposed and that progress in one field necessarily impedes the other. The independence approach is somewhat more nuanced and suggests that science and religion are simply two separate domains that should not have any border

transgressions. You might recognize this as Gould's (1999) notion that science and religion are non-overlapping magisterial, or NOMA.

Integration asserts that common ground must be actively sought and established when conflict is perceived between one's scientific and religious perspectives. Barbour's last approach, dialogue, does not go as far as strict integration, but suggests that scientific and religious worldviews should continuously communicate and learn about one another's histories, underlying assumptions, and methods of inquiry.

I provide several examples of historical and contemporary theologians and scientists who represent each approach, and students participate in an informal debate or write brief position statements about the most appropriate way to address science-religion relationships in the twenty-first century.

Historical and Contemporary Case Studies: Formal Student Presentations

During the first two weeks, the class is divided into groups of three to five students who prepare seminar-style presentations to be conducted during an entire class period at various points during the semester. Students present science-religion themes based on advances in physics, astronomy, and biology in the seventeenth and eighteenth as well as twentieth centuries up to the current day. Thus, six groups are formed.

Although Parts I and III of Barbour (1997) are structured around these scientific domains and time periods, students are encouraged to use other resources, including brief instructional videos. Each group is required to include an activity that engages their peers and to assemble electronic slides for future reference. Assessment for the group presentation is fairly straightforward—e.g., quality of slides, equal participation, class interaction, and organization—and addresses the following questions at a minimum:

- What were the assumptions about the natural world and/or of science during this period?
- What were some of the religious/spiritual/theological assumptions of the time?
- What ideas, breakthroughs, scientific theories, intellectual revolutions, etc., changed or challenged scientific and/or religious perspectives?
- Who were some of the key scientists (or just thinkers in general) who fomented change?

- What are some of the key scientific concepts that we should remember?
- How does your chapter relate to the concepts we discussed in the first part of the course?
- What lessons can we learn for today, or what science-religion issues still persist today?

Foci of the earlier time periods naturally include Galileo, Newton, and Darwin. More contemporary topics include cosmological origins of the universe, quantum mechanics, and the neo-Darwinian revolution following the discovery of the structure of DNA. Students majoring in science are assigned the more contemporary topics so that they can explain them more easily to their classmates. These presentations constitute a significant portion of the course; six of the thirty class meetings to be precise.

Biological Evolution in the United States: A Necessary Case Study

Evolution and its social, cultural, and legal implications remain vital topics to understand even 150 years after the publication of Darwin's (1859) *On the Origin of Species*. To this end, I lead a series of lessons on the varied scientific and theological responses to Darwin's ideas, various manifestations of Social Darwinism, the Christian Fundamentalist backlash in the United States, and the legal history from Scopes to Kitzmiller. Perhaps like me about twelve years ago, most of my students do not realize how opposition to evolution and Darwin is woven into our national fabric.

In brief, if you are not familiar with this history, Barbour (1997), Larson (2002), and Principe (2006) remind us that Darwin's ideas were rapidly and widely accepted in scientific circles. Natural selection based on variation in physical traits and population-level thinking helped biology develop from a largely descriptive field to one with an explanatory and predictive theoretical framework.

Immediate reactions from theologians and religious leaders, however, were understandably mixed. Some asserted that natural selection was one mechanism through which a supernatural creator interacted with the physical world, an approach referred to as theistic evolution. Others argued that evolution denied the existence of a supernatural creator and necessarily led to atheism and a strict materialist worldview that is often the primary objection given by Christian Fundamentalists beginning in the early 1900s and continuing to the present day.

Students generally understand the science of evolution and the student-led seminars review the basic concepts. The complex, often religiously motivated, responses tend to prompt a great deal of discussion since many of my students have direct experience with these responses through their families and peers. This history helps to explain the persistence of anti-evolution sentiments within some religious communities and in organizations such as the Institute for Creation Research, Answers in Genesis, and the Discovery Institute.

Students take a particular interest in how Darwin's ideas were co-opted for other purposes, including economic and immigration policy, eugenics, imperialism, and justification for war collectively known as Social Darwinism. In this case, I assign readings from *Darwin's Coat-Tails: Essays on Social Darwinism* (Crook 2007).

Finally, I give a lesson or invite a colleague from the political science department with expertise in First Amendment issues—in particular the Establishment and Free Exercise clauses—to give the legal history including the Scopes' "monkey" trial (see Larson 1998), *Epperson v. Arkansas*, *McLean v. Arkansas Board of Education*, *Aguillard v. Treen*, and *Kitzmiller v. Dover Area School Board*. Prior to this lecture, students watch and participate in a discussion about the PBS (2007) documentary of the Kitzmiller trial, *Judgment Day: Intelligent Design on Trial*.

Comparative Religion and Science

By Barbour's (1997) own admission, *Religion and Science: Historical and Contemporary Issues* focuses almost entirely on western Christianity. To broaden students' perspective, small groups of students are assigned other faith traditions to consider and present: Hinduism, Buddhism, Judaism, Islam, Indigenous Religions, Atheism (which I purposefully include as a faith tradition), and Religious Naturalism. I also give the option of further explaining contemporary Christian responses to science, subdivided into Catholicism and Protestantism.

I provide chapters from the *Oxford Handbook of Religion and Science* (Clayton and Simpson 2006) as well as articles from the Zygon Institute, but students are free to use other resources to explain the basics of these traditions such as the core beliefs and practices, sacred texts, influential figures, views of the afterlife or transcendence, worldwide distribution of adherents, and comparisons to Barbour's (1997) general characteristics of religion. With respect to between science and religion, they address the following questions:

- How would you characterize the relationship between this religious tradition and science?
- Are there any particular areas of agreement or cooperation?
- Are there any particular areas of conflict?
- Are there any critiques of Western science from the point of view of this tradition?
- What lessons can we draw from these traditions in the twenty-first-century United States?

Students find this particular set of lessons especially fascinating because it provides them the opportunity to consider faiths other than Christianity and to see how scholars critique Barbour's categorical—or even dualistic—approach to relationships between religion and science.

Contemporary Issues at the Intersection of Science and Religion

With the remaining time in the course, we address specific societal issues with both scientific and religious implications. Environmental ethics and, in particular, climate change and sustainability are standard topics as are the bioethics of genetic modification. Other viable options are religious pluralism in a globally connected world; information technology and the effects of social media; economic inequality exacerbated by technology, race, and gender; and the neurological basis of religious belief.

Previous resources can be used here, but it is also easy to find editorials or position statements about a particular issue from, for example, faith-based organizations. The general idea we consider here is the extent to which scientists and scientific organizations should cooperate with religious individuals and institutions to address environmental degradation and injustices as well as the limits of science to describe human thought, behavior, and morality: a powerful way to end the semester.

ADDITIONAL ASSESSMENTS AND ACTIVITIES

Consistent with other honors programs, I assign a substantial amount of writing. Take-home midterm and final exams ask students to respond in more depth to any of the above topics that they did not present to their peers. For example, I ask students to write a compare-and-contrast essay about two faith

traditions and the associated responses to science. In other instances, I provide them an extensive list of topics from which to choose.

In the midterm, students critique a rather radical view of science from Paul Feyerabend in his essay "How to Defend Society Against Science" (there is no one internet resource for this, so I recommend doing a quick search). For the final, students include a revised personal statement about science and religion that draws from course resources that influenced their thinking.

For the semester research paper, students have the latitude to pick any science-religion topic. They often choose to go more in-depth on a previous topic. Some write biographies of influential science-religion thinkers, and others include a public engagement component such as interviewing local teachers about teaching evolution or designing a survey to administer to their peers.

During our final exam period, students participate in an informal competition in the spirit of the Three Minute Thesis <https://threeminutethesis.uq.edu.au>. They are permitted only to use the chalkboard for notes as they summarize the key aspects of their semester papers. Students vote for the top presentations, and I provide prizes, typically food.

As available, I invite guest speakers, e.g., local clergy or religious scholars, to organize faculty panel discussions or ask colleagues to present a science-religion topic. For example, a colleague from the psychology department presented an article on personality and religious beliefs. Involving faculty is a significant asset, and an oversight on my part was not inviting colleagues to attend the student-led seminars; in future courses I will advertise the Thursday Science-Religion Seminar Series and invite all faculty to attend.

RECOMMENDATIONS, FUTURE DIRECTIONS, AND CONCLUSIONS

While it is not possible to be an expert on all things related to science and religion and when science-religion scholars devote their professional lives to these topics, that level of commitment is not necessary to structure and guide an honors seminar on these worthy and sometimes daunting issues. A liberal arts course can be assembled in the tradition of a bricolage to adapt to your students whether you go it alone or co-teach.

Picking appropriate primary resources is crucial. Barbour (1997) is a good option, but my students found it a bit repetitive after the first several weeks. A later text (Barbour 2000), *When Science Meets Religion: Enemies,*

Strangers, or Partners?, or Larson and Ruse's (2017) *On Faith and Science* might be better options worth reviewing.

I have had tremendous support from my colleagues, even from those who do not associate with a particular religious tradition and from others who assert that religion is ultimately a detriment to society. I make it clear that I am not teaching a course that emphasizes how to reconcile science with a particular faith. Many books and other resources do exactly that, but my broader effort inevitably resonates with students given the scientific nature of contemporary society and the ongoing influence of religion.

Toward the end of the last course, I read an essay by Barbour (2014) that was published in Zygon shortly after his passing. He acknowledged then, as he did throughout his career, that thinking about science and religion in a categorical manner is only a starting point. He urged us to consider much deeper and more complex interactions between science, religion, technology, and ethics. As an educator, I also want to include my students' knowledge, beliefs, experiences, concerns, fears, and values since I have discovered that conversations about science and religion often prompt introspection. A more appropriate title for the course would be "Science, Religion, Self, and Society," which is what I will call it from now on.

REFERENCES

Barbour, I. G. 1997. *Religion and science: Historical and contemporary issues*. New York, NY: HarperCollins.

Barbour, I. G. 2000. *When science meets religion: Enemies, strangers, or partners?* New York, NY: HarperCollins.

Barbour, I. G. 2014. Zygon's dual mission. *Zygon: Journal of Religion and Science*, *49*(1), March 2014.

Clayton, P., and Z. Simpson. 2006. *The Oxford handbook of religion and science*. New York, NY: Oxford University Press.

Crook, P. 2007. *Darwin's coat-tails: Essays on social Darwinism*. New York, NY: Peter Lang.

Darwin, C. 1859. *On the origin of species.* Cambridge, MA: Harvard University Press.

Ecklund, E. H. 2010. *Science vs. religion: What scientists really think*. New York, NY: Oxford University Press.

Gould, S. J. 1999. *Rocks of ages: Science and religion in the fullness of life*. New York, NY: Ballantine.

James, S. M., and K. E. Bruce. 2009. Evolution and human nature: Comparing honors and traditional pedagogies for the new science of the mind. *JNCHC 10*(2), 93–102.

Lam, T. 2012. Philosophy in the service of science: How non-science honors courses can use the evolution-ID controversy to improve scientific literacy. In *The Other Culture: Science and Mathematics Education in Honors.* Ed. Ellen B. Buckner and Keith Garbutt. Lincoln, NE: National Collegiate Honors Council, 61–71. NCHC Monograph Series.

Larson, E. J. 1998. *Summer for the Gods: The Scopes trial and America's continuing debate over science and religion*. Cambridge, MA: Harvard University Press.

Larson, E. J. 2002. *The theory of evolution: A history of controversy*. Chantilly, VA: The Teaching Company.

Larson, E. J., and M. Ruse (2017). *On faith and science*. New Haven, CT: Yale University Press.

Marsden, G. M. 2006. *Fundamentalism and American culture*. New York, NY: Oxford University Press.

National Center for Science Education (NCSE). 2018. *Kitzmiller v. Dover: Intelligent design on trial.* <https://ncse.com/library-resource/kitzmiller-v-dover-intelligent-design-trial>

Numbers, R. L. 2006. *The creationists: From scientific creationism to intelligent design*. Cambridge, MA: Harvard University Press.

Principe, L. M. 2006. *Science and religion*. Chantilly, VA: The Teaching Company.

Public Broadcasting System. 2007. *Judgment day: Intelligent design on trial.*

Shippensburg University of Pennsylvania. 2018. Wood Honors College. <https://www.ship.edu/honors/faculty/welcome>

The author may be contacted at

JWShan@ship.edu.

APPENDIX

Course Syllabus

Introduction to the Historical Interactions between Science and Religion (HON 393 Selected Topics)

General Course Description

This Honors Seminar will provide students with a philosophical and historical overview of the interactions between science and religion, two indisputably profound cultural forces. The epistemological differences between science and religion will be addressed along with various perspectives and specific examples regarding their interactions. Although science-religion relationships are often portrayed as hostile and divisive, in particular, with conflicts over teaching biological evolution in the United States, this seminar will broaden students' historical perspective and, thus, increase understanding of contemporary issues related to science and religion. In addition to traditional journal responses, class discussions, and exams, students will select a supplemental project that explores a specific topic in depth.

Required Materials

Barbour, I.G. 1997. *Religion and science: Historical and contemporary issues*. HarperCollins: New York.

Assignment Descriptions (additional detail on D2L as needed)

Journal Responses and Assignments for Class Readings

Face-to-face meetings will center on concepts from class readings. With each reading assignment, students are expected to paraphrase the primary concepts and to respond to the instructor's questions. Traditional journal responses will be used in addition to discussion boards on D2L and other alternative assignments as appropriate.

Class Participation

Class discussion will be a, if not the, centerpiece of the course. Each student is expected to contribute to each class discussion to demonstrate a basic understanding of the readings and other assignments as well as to ask questions that, for example, address concepts that are unclear, challenge classmates and instructor, and suggest areas for further study.

Leading Class Discussions

Pairs or small groups of students will be assigned sections of the primary text and/or supplemental resources to present to classmates during face-to-face sessions. Presentations will include both a lecture portion as well as an activity that engages the entire class in the topic.

Quizzes and Exams

Short, "honesty check" quizzes will be given periodically to ensure that students understand basic definitions and concepts. Essay-style midterm and final exams will require students to apply concepts more broadly to a series of questions that will be provided in advance.

Initial and Final Drafts of a Personal Statement about Science and Religion

Both drafts will address students' personal understandings of science, religion, and their interactions. The initial draft will be submitted early in the course and the final draft will ask students to incorporate concepts from readings and discussions to clearly demonstrate a broader, more nuanced perspective.

Supplementary Semester Project

The semester project will consist of two parts. First, students will write a traditional research paper that addresses a topic of relevance to science and religion. Several possible topics will be discussed in class. Second, the research paper will be complemented by a presentation given in class to your classmates and invited guests. Depending on time, this might be done during our final exam period.

Point Values and Grading Scale

Journal Responses/Activities—100 points	A	100–95%	C+	79–76%
Leading class discussions—50 points	A-	94–90%	C	75–70%
Quizzes—50 points	B+	89–87%	D	70–65%
Midterm exam—100 points	B	86–83%	F	≤ 65%
Final Exam—100 points	B-	82–80%		
Supplementary Semester Project—200 points				
Initial draft of personal statement—25 points				
Class Participation—50 points				

Selected Course Learning Outcomes

- To understand epistemological distinctions between science and religion.
- To understand various philosophical perspectives about the interactions between science and religion: Warfare, Independence, Integration, Dialogue.
- To understand science-religion interactions during the scientific revolution of 17th-century Europe, in particular, through the work of Galileo and Newton.
- To understand scientific and theological responses to Darwin following the publication of *On the Origin of Species*.
- To understand scientific and theological responses to scientific theories fields other than biology such as cosmology, quantum mechanics, and geology.
- To understand the religious objections to evolution in the United States via the rise and persistence of Christian Fundamentalism.
- To compare and contrast the responses of various religious traditions to science.

Consistency with Honors Program Learning Outcomes

There are six learning outcomes associated with the Shippensburg University Honors Program <http://www.ship.edu/Honors/Curriculum/Student_Learning_Outcomes>. Outcomes 3–5 are related to students' ability to conduct and disseminate original research and to assume leadership roles within the Honors Program. These outcomes are likely beyond the scope of this course. Outcomes 1, 2, and 6, however, strongly relate to an understanding of the historical and philosophical interactions between science and religion. Each is provided below with a brief explanation in boldface as to the relevance to this course:

1. Apply the tools (methodologies/content/skills) of multiple disciplines to analyze and/or solve complex issues and problems.

   The nature of the course is multidisciplinary. Themes related to history, theology, science, philosophy, and sociology are necessarily included.

2. Work collaboratively with persons from different fields of specialization in diverse, cross-disciplinary teams to analyze and/or solve applied, real-world issues and problems.

   The students in the course are from a variety of majors and the seminar-style structure of the course delivery will require collaboration.

6. Appreciate the importance of civic responsibility and demonstrate informed and engaged civic responsibility by having participated regularly in community service and/or service-learning projects.

   Understanding interactions between science and religion is an important aspect of being an informed citizen.