

## Philosophical Issues in Religion and Science

Course Number: Religion 451/551

Institution: University of Southern Mississippi

Instructor: David M. Holley

### Course Description:

This course is an examination of some of the major epistemological, metaphysical, and hermeneutical questions that arise in attempts to take seriously the claims of religious traditions while accepting a scientific world view. Topics to be considered include the nature of scientific and religious understanding, historical encounters between science and religion, philosophical responses to the Newtonian universe, post-Newtonian views of the material world, the place of human reality in a physical world, metaphysical interpretations of contemporary cosmology and evolutionary theory, and the concept of divine action in relation to scientific law.

### Course Content:

This course is an attempt to deal with some of the central philosophical issues that arise in attempts to take seriously scientific thought about the natural world and religious approaches to reality. While the focus will be on the possibilities for reconciling theistic religions with science, the course will also allow for some consideration of the significance of science for Eastern religious traditions. Following is a summary of the six course units:

#### I. Epistemological Issues: Scientific Knowledge and Religious Knowledge

In our culture science is often associated with objective knowledge and religion with subjective opinion. However, there is reason to question this sharp dichotomy. Contemporary work in the philosophy of science has revealed a more complex picture of scientific investigation. Far from being a neutral and dispassionate assessment of objectively determined facts, scientific work proceeds in accordance with frameworks and values reflecting the consensus of the scientific community or some subgroup of that community. Particular observations are often “theory-laden,” having the significance they are taken to have only within a certain set of theoretical assumptions. Moreover, theories may be revised in a variety of ways to accommodate recalcitrant data. Some philosophers have concluded that the level of judgment needed for scientific work undermines the claims of science to make progress, or even to be a rational procedure. However, a more promising approach is to recognize in all human rationality, including science, elements of personal judgment that are not reducible to explicit rules.

Given a more realistic picture of scientific procedure, it is easier to recognize in other disciplines claims to rationality. While we can easily notice difference between the way science works and the way disciplines like theology proceed, careful attention will also reveal important similarities. Religious traditions appeal to certain paradigmatic

experiences that are understood in terms of frameworks that give the adherent an orientation. Yet these frameworks must be rendered intelligible by restatement in terms of the cultural demands of different historical eras.

Recognizing the possibility of regarding science and religion as alternative approaches to knowledge raises the question of how to relate the two. This problem is avoided by the position of scientism that assumes that only science is a genuine path to knowledge. However, scientism is a debatable view, and its merits or demerits will be considered throughout the course.

Required Reading:

Ian Barbour, *Religion and Science: Historical and Contemporary Issues*, Harper, 1997, chapters 4-6 (Ways of Relating Science and Religion; Models and Paradigms; Similarities and Differences).

Anthony O'Hear, *Introduction to the Philosophy of Science*, Oxford, 1989, chapters 1-7.

Suggested Reading:

Kitty Ferguson, *The Fire in the Equations: Science, Religion & the Search for God*, Eerdmans, 1994, chapters 2-3 (Seeing Things; Almost Objective).

John Polkinghorne, *Belief in God in an Age of Science*, Yale, 1998, chapter 2 (Finding Truth: Science and Religion Compared).

Background Reading:

Michael Banner, *The Justification of Science and the Rationality of Religious Belief*, Oxford, 1990.

Philip Clayton, *Explanation from Physics to Theology: An Essay in Rationality and Religion*, Yale, 1989.

Mary Gerhart and Allan Russell, *Metaphoric Process: The Creation of Scientific and Religious Understanding*, TCU, 1984.

Clark Glymour, *Philosophy of Science*, Westview, 1999.

Robert Klee, *Introduction to the Philosophy of Science: Cutting Nature at its Seams*, Oxford, 1996.

Thomas Kuhn, *The Structure of Scientific Revolutions*, Chicago, 1962.

John Lossee, *A Historical Introduction to the Philosophy of Science*, Oxford, 1993.

Alister McGrath, *Science & Religion: An Introduction*, Blackwell, 1999, chapters 2-3, 7 (Religion: Ally or Enemy of Science?, Religion and the Philosophy of Science, Models

and Analogies in Science and Religion).

Michael Polanyi, *Personal Knowledge*, Harper & Row, 1964.

Holmes Rolston, *Science and Religion*, Random House, 1987, chapter 1 (Methods in Scientific and Religious Inquiry).

Edward Scheon, *Religious Explanations: A Model from the Sciences*, Duke, 1985.

Nicholas Wolterstorff, *Reason Within the Bounds of Religion*, Eerdmans, 1984.

## II. Some Historical Perspective: From the Medieval World View to Modern Science

Before the rise of modern science, the Western World had a picture of reality that combined science and religion. Aquinas' synthesis of Christian theology with Aristotelian philosophy provided the basis for a unified vision of nature. In Aristotelian science the categories of formal and final aitia drew attention to the particular nature of each thing and the goal-directed behavior expressed by that nature. Such an understanding fit well with a theological account of a universe created by God who gives things their nature and ends. Furthermore, this synthesis was conducive to a hierarchical account of the place of each thing within the created order.

Modern science challenged this synthesis in a variety of ways. Copernican cosmology shifted the position of the earth from the center of the system, a change that was symbolically significant. Galileo's research undermined the idea of a perfect heavenly realm that was sharply different from the earthly realm. Furthermore, he initiated a program of scientific research that banished formal and final aitia in favor of material and efficient explanations. The picture of reality that begins to take shape is of a vast system of material particles in space whose characteristics are mathematically specifiable. The vision of a universe that can be described in terms of matter, moving in accordance with precise laws of motion reached its culmination in the work of Newton.

The mechanistic picture of the universe that increasingly came to dominate thinking in the eighteenth century was difficult to reconcile with traditional religious views. The work of major philosophers of the modern period can be read as attempts to develop coherent accounts of reality that make room for both science and religion. The dualism of Descartes, the pantheism of Spinoza, the idealism of Leibniz and Berkeley, and the transcendental philosophy of Kant show us the major options by which thinkers of this period sought to make peace with a fundamentally mechanistic order.

Required Reading:

Ian Barbour, *Religion and Science*, Chapters 1-2 (Physics and Metaphysics in the Seventeenth Century; Nature and God in the Eighteenth Century).

Jennifer Trusted, *Physics and Metaphysics: Theories of Space and Time*, Routledge, 1994, chapters 1-7.

Suggested Reading:

Ronald Pine, *Science and the Human Prospect*, Wadsworth, 1989, chapters 5-6 (Cultural Roots: The Copernican Religion; Cultural Roots: Science as a Religion)

Alister McGrath, *Science and Religion: An Introduction*, chapter 1 (Historical Landmarks).

Background Reading:

John Brooke, *Science and Religion: Some Historical Perspectives*, Cambridge, 1991.

Michael Buckley, *At the Origins of Modern Atheism*, Yale, 1987.

E. A. Burt, *The Metaphysical Foundations of Modern Science*, Doubleday, 1952.

John Dillenberger, *Protestant Thought and the Natural Sciences*, Notre Dame, 1960.

Amos Funkenstein, *Theology and the Scientific Imagination from the Middle Ages to the Seventeenth Century*, Princeton, 1986.

David Lindberg and Ronald Numbers, *God and Nature: Historical Essays on the Encounter Between Christianity and Science*, California, 1986.

Mark Worthing, *God, Creation, and Contemporary Physics*, Fortress, 1996, chapter one (Physics and Theology in Historical Perspective).

### III. From the Mechanistic Universe to Contemporary Physics

The picture of the physical world that dominates the popular imagination is much like the mechanistic universe of Newton. However, contemporary physics has moved beyond the Newtonian paradigm to give us a much more puzzling and mysterious account of the material world. Relativity physics posits a universe in which mass changes with velocity and common sense ideas of simultaneity do not apply. Quantum mechanics reveals a reality at the microscopic level where our ordinary notion of causality does not apply and where we represent certain realities mathematically as probability functions, though we cannot picture what these realities are like. Chaos and complexity theories reveal the limits of our ability to predict what will happen in a dynamic system and show us surprising ways in which self-organizing systems behave. If we are to try to relate religious conceptions to the physical sciences, it is important to make sure that we are not using an outdated version of what those sciences claim.

Required Reading:

Ian Barbour, *Religion and Science*, chapter seven (Physics and Metaphysics, 165-184).

Paul Davies and John Gribbin, *The Matter Myth: Dramatic Discoveries that Challenge Our Understanding of Physical Reality*, Simon and Schuster, 1992.

Suggested Reading:

Ronald Pine, *Science and the Human Prospect*, chapters 7-8 (Our Time: Understanding the Theory of Relativity; Our Time: Quantum Physics and Reality).

Holmes Rolston, *Science and Religion*, chapter two (Matter: Religion and the Physical Sciences).

Jennifer Trusted, *Physics and Metaphysics*, chapters 8-10.

Background Reading:

Murray Gell-Mann, *The Quark and the Jaguar: Adventures in the Simple and Complex*, Knopf, 1994, chapters 10-15.

James Gleick, *Chaos: Making a New Science*, Penguin, 1987.

John Polkinghorne, *The Quantum World*, Princeton, 1984.

Ilya Prigogine and Isabelle Stengers, *Order Out of Chaos*, Bantam, 1984.

Robert John Russell, et al., *Physics, Philosophy and Theology: A Common Quest for Understanding*, Notre Dame, 1988.

Lawrence Sklar, *Philosophy of Physics*, Westview, 1992, chapter 2, 4 (Space, Time, and Motion; The Quantum Picture of the World).

#### IV. The Physical World and Human Reality

One of the primary challenges to a religious conception of human life is a reductionist vision of science that accounts for wholes in terms of deterministic laws governing the parts. This is the vision of classical forms of materialism. One philosophical response to materialism is to posit a dualist view in which mind or soul is sharply distinguished from physical reality. But this kind of approach raises a number of philosophical puzzles. An alternative that is being put forth by a number of theologians (and scientists) is to view the reality of complex wholes in terms of levels, with higher levels dependent on the component parts, but exhibiting an emergent reality that is not reducible to the laws regulating the parts. On this approach, mind is regarded as an emergent product of the brain's hierarchical system.

This section explores the possibility of using levels thinking to do justice to human realities that are important to religious accounts. Issues to be considered include such questions as: What is a person? Can there be nonbiological persons? Do human beings possess freedom? How can there be values in a world of facts? What is needed for personal identity? In addition to considering these questions in relation to contemporary scientific theories, we will also make use of some science fiction scenarios to stretch our imaginations.

Required Reading:

Ian Barbour, *Religion and Science*, chapter 7, ( Physics and Metaphysics, 184-194).

Richard Hanley, *Is Data Human? The Metaphysics of Star Trek*, Basic Books, 1997.

John Polkinghorne, *One World*, SPCK, 1986, chapter six (Levels of Description).

Suggested Reading:

John Haught, *Science and Religion*, Paulist, 1995, chapter four (Is Life Reducible to Chemistry?).

Arthur Peacocke, *Theology for a Scientific Age: Being and Becoming – Natural, Human, and Divine*, Fortress, 1993, Part I, chapters 1-5 (Natural Being and Becoming); chapter twelve (Natural Human Beings).

Background Reading

James Ashbrook and Carol Albright, *The Humanizing Brain: Where Religion and Neuroscience Meet*, Pilgrim, 1997.

Murray Gell-Mann, *The Quark and the Jaguar*.

Michael Murphy and Luke A. J. O'Neill, *What Is Life? The Next Fifty Years: Speculations on the Future of Biology*, Cambridge, 1995.

Nancey Murphy and George Ellis, *On the Moral Nature of the Universe: Theology, Cosmology, and Ethics*, Fortress, 1996, chapter two (The Hierarchy of the Sciences).

Michael Waldrop, *Complexity: The Emerging Science At The Edge of Chaos*, Simon and Schuster, 1992.

## V. Cosmology and Evolutionary Development: Theistic and Naturalistic Interpretations

The scientific account of the universe gives it a history. According to this story, the universe that now exists has changed significantly. If we extrapolate backwards around fifteen billion years, our universe was a condensed hot mass that expanded in what is commonly called the Big Bang. From this state the universe formed stars and galaxies. Elements like carbon were formed in the early stars and eventually became a component of life when our sun and earth took shape. On the earth biological science tells the story of the gradual development of life forms which in time came to include creatures like us who are able to learn and tell the story.

Religious stories of origins typically take a very different form, and this has been a source of some tension. However, the element of conflict has often been overstated. Darwin's theory in the nineteenth century made necessary some revisions of traditional religious ideas, but some of the strongest defenders of the theory were themselves religious

believers. Attempts to integrate science with religious stories about creation raise the question of how religious stories about creation are to be interpreted. This section considers the relation between religious stories and scientific stories.

There are also significant conflicts within the scientific community about how the scientific stories should be told. In our day there is a major controversy between neo-Darwinian and post-Darwinian versions of evolutionary development. Our main concern in this unit, however, will focus on alternative ways of interpreting the significance of cosmology and evolution, specifically a naturalistic perspective represented by Richard Dawkins and a theistic approach represented by Keith Ward.

#### Required Reading:

Ian Barbour, *Religion and Science*, chapters 3, 8, and 9 (Biology and Theology in the Nineteenth Century; Astronomy and Creation; Evolution and Continuing Creation).

Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design*, Norton, 1986 (selected portions).

Keith Ward, *God, Chance & Necessity*, Oneworld, 1996.

Keith Yandall, *Philosophy of Religion: A Contemporary Introduction*, part four (Arguments Concerning Nonmonotheistic Religions).

#### Suggested Reading

John Haught, *Science & Religion: From Conflict to Conversation*, chapters 3, 5-8 (Does Evolution Rule Out God's Existence? Was The Universe Created? Do We Belong Here? Why is there Complexity in Nature? Does the Universe Have a Purpose?)

Ronald Pine, *Science and the Human Prospect*, chapters one and three (Our Cosmological Roots; Our Biological Roots: Evolution and Philosophical Issues).

#### Background Reading:

John Barrow and Frank Tipler, *The Anthropic Cosmological Principle*, Oxford, 1986.

Tim Berra, *Evolution and the Myth of Creationism: A Basic guide to the Facts in the Evolution Debate*, Stanford, 1990.

William Lane Craig and Quentin Smith, *Theism, Atheism, and Big Bang Cosmology*, Oxford, 1993.

Willem Drees, *Beyond the Big Bang: Quantum Cosmologies and God*, Open Court, 1990.

David Hull, *Science as a Process: An Evolutionary Account of the Social and Conceptual Development of Science*, Chicago, 1988.

Ernan McMullan, (ed.) *Evolution and Creation*, Notre Dame, 1985.

Alister McGrath, *Religion and Science: An Introduction*, chapters 4-6 (Science and the Philosophy of Religion, Creation and the Sciences, Natural Theology: Finding God in Nature).

Mary Midgley, *Evolution as a Religion: Strange Hopes and Stranger Fears*, Methuen, 1985.

Henry Morganau and Roy Varghese (eds.), *Cosmos, Bios, Theos: Scientists Reflect on Science, God, and the Origins of the Universe, Life, and Homo sapiens*, Open Court, 1992.

Holmes Rolston, *Science and Religion*, chapter three (Life: Religion and the Biological Sciences).

Elliott Sober, *Philosophy of Biology*, Westview, 1993, chapters 1-2 (What Is Evolutionary Theory?; Creationism).

William Stoeger and Robert Russell, Case Study I: "Cosmology and Creation," in Mark Richardson and Wesley Wildman, *Religion and Science: History, Method, Dialogue*, Routledge, 1996.

John Templeton, *Evidence of Purpose: Scientists Discover the Creator*, Continuum, 1996.

Mark Worthing, *God, Creation, and Contemporary Physics*, Fortress, 1996.

#### VI. Divine Action and Scientific Law:

Theistic religions conceive of God as an agent who performs actions. If we believe that nature operates in accordance with certain regularities that science discovers, the question can be raised about how a divine agent could be conceived as acting. Does God violate scientific law? Are God's actions like interventions from outside the system? Or should divine actions be conceived as occurring within the bounds of scientific regularities? In this section consideration is given to the nature of scientific law and to various proposals about a place for divine action. These include the ideas that quantum theory or chaos theory provides the kind of flexibility a divine agent would need. Also considered is what some theorists call "top-down" causation.

#### Required Reading:

Ian Barbour, *Religion and Science*, chapter twelve (God and Nature).



John Polkinghorne, *Belief in God in an Age of Science*, Yale, 1998, chapter three (Does God Act in the Physical World?).

#### Suggested Reading:

Arthur Peacocke, *Theology for a Scientific Age*, chapter nine (God's Interaction With the World).

Holmes Rolston, *Science and Religion*, chapters six and seven (Nature and History; Nature, History, and God).

#### Background Reading:

John Polkinghorne, *Science and Providence: God's Interaction With the World*, Shambhala, 1989.

Robert Russell, Nancey Murphy, and C. J. Isham (eds.) *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action*, Vatican, 1993.

Robert Russell, Nancey Murphy, and Arthur Peacocke, *Chaos and Complexity: Scientific Perspectives on Divine Action*, Vatican, 1995.

Richard Swinburne, *The Concept of Miracle*, St. Martin's Press, 1970.

Keith Ward, *Divine Action*, Harper Collins, 1990.

Maurice Wiles, *God's Action in the World*, SCM, 1986.

#### Pedagogical Approach:

Although the topics and reading material give a definite shape to the course, the instructional approach is more open-ended than a reading of the summary of course content might suggest. The basic approach emphasizes a cooperative exploration of the issues by the class. In laying out ground-rules for discussion, I emphasize the need for respectful listening and consideration of viewpoints that are different from our own. I suggest that we assume that no one, including the teacher, has all the answers, and that we can sometimes learn important things even from views that we ultimately judge to be mistaken.

The organization of the class sessions typically starts with an exercise related to the reading material that gets members of the class working together as small groups. The kinds of activities used are designed to produce learning at a variety of levels. Some enhance understanding of the authors we have read. Others get students to think about ideas in creative or imaginative ways. The instructor enters the discussion by clarifying the contributions of members of the class, and then attempts to move the class to deeper levels of understanding. This requires some sensitivity on the part of the instructor to

where the class most needs to go on a particular day.

During the course there are two essay exams and two major writing assignments. The first writing project involves a critical discussion of a scholarly article on science and religion from a journal such as *Zygon*. I have found that while this kind of assignment allows students to have some choice of topic, the discipline of responding to a specific thesis is more valuable than the typical research paper. Students have to do research to be able to respond intelligently to a scholarly article, but the prescribed task gives their efforts more of a focus and challenges them to take seriously ideas they might have been tempted to dismiss too quickly. The second assignment is a critical response to the dispute in the assigned reading material between Keith Ward and Richard Dawkins about whether scientific cosmology and evolutionary theory should be interpreted naturalistically or theistically. Having students write about this touchy issue in terms of the strengths or weaknesses of these authors gets them into the discussion without raising the problems of a position paper in which they must become more personally vulnerable. Although this issue is fairly difficult, students have the benefit of being able to write about it after participating in class discussions on the reading material. This assignment functions like a take-home exam on an important portion of the course material. (Graduate students enrolled in the course -- probably 2-4 -- will do the first of these assignments and a more advanced assignment described below.)

The midterm and final exams are in-class essay exams for which I will give students a study guide from which exam questions will be selected. Many of these questions will have appeared earlier in some form on in-class group exercises. The exams will count together for about 60% of the class grade, and the outside written assignments will each count for about 20%. Borderline cases will be decided on the basis of contribution to discussion and activities in class.

#### Written Assignments:

1. All undergraduate and graduate students will submit an analysis of an article in a professional journal (not a magazine) on a topic in religion and science. A good source for articles of this type is the journal, *Zygon*. You may select an article from another journal, but make sure to get your choice approved by the instructor before you do much work on it. To do a good article analysis, you will need to get a background in the area by reading other articles on the same topic. Your sources should be acknowledged by footnotes and bibliography. The citations need to utilize a standard form that is sufficient for others to find the source you use. (Note that you need to cite, not only direct quotations, but ideas that you take from a written source.)

The article analysis should include (1) an account of what the article says that clarifies and explains what the key issue is and what thesis the author is trying to establish, (2) a discussion of the basic reasons or arguments the author uses to defend his or her claims, and (3) an evaluation of whether the author has or has not established the thesis. You may use the claims of other authors in discussing the article you are working on, but the evaluation should exhibit your own judgment which is supported by cogent reasoning,

not just a summary of what other people think. Graduate students should write this article analysis as if you were writing a reply to the article for submission to the same journal. The article analysis is due at the time indicated on the course schedule. It should be somewhere in between 1500 and 2500 words. (Graduate papers may be longer, if necessary.) Factors considered in grading include clarity, understanding of the author and the topic, organization, strength of reasons or arguments used to defend your judgment, anticipation and reply to potential objections, and grammar and mechanics.

2. Undergraduate students will do a critical response to the debate in our assigned reading material between Richard Dawkins and Keith Ward. Dawkins gives an atheistic interpretation of the data of evolutionary theory, and Ward interprets contemporary evolution and cosmology as confirming theism. The paper should show an attempt to understand each author as sympathetically as possible. What are they saying? What reasons does each use to back up his claims? Are there any unclear points? What is the most charitable way of clarifying these points? The paper should also discuss what issues are central in the dispute between them, what elements in the two positions are strong or weak, and whether one interpretation can be shown to be superior to the other. You should be trying to put each writer in as strong a light as possible, but you are also looking at the issue they discuss to evaluate the strengths or weaknesses of their accounts. Criteria for grading include clarity, understanding of both authors, recognition of key issues, cogency of reasons used in defense of your critical judgments, and grammar and mechanics. While this paper is primarily about your response to these writers, you may find it useful to do additional reading on the topic to help you make informed judgments. The paper is due at the time indicated on the class schedule. It should be in the range of 1500-2500 words.

3. Instead of the critical analysis, graduate students should prepare an article on some important issue in religion and science for submission to a professional journal that accepts articles in this area. On your title page indicate for which journal your article is to be submitted. Become thoroughly familiar with the journal you are writing for: the kinds of articles they accept, format, style, etc. You need to develop a clear thesis that you defend cogently, addressing any important scholarly discussion relevant to your topic. Remember that the audience you are writing for is the audience of your journal, so you can assume the kind of knowledge that articles in that journal typically assume. The paper should be in the range of 3000 to 3500 words. It is due by the last class day before final exams. (Remember that you can discuss your ideas with the instructor who will try to help you develop your paper in a fruitful direction.)

Course Schedule:

The course will be offered in two weekly sessions over a fifteen-week semester.

Day 1 Introduction to the Class

Group Activity: Characterizing Religion and Science: Our Preconceptions

Discussion

Preview of Class Topics and Ground Rules for Discussion

## I. Epistemological Issues

Day 2 Barbour, chapter 4 (Ways of Relating Science and Religion); O’Hear, chap. 1-2 (Science as an Intellectual Activity; Induction).

Group Activity: Observation and Theory

Presentation: Scientific Method

Day 3 Barbour, chapter 5 (Models and Paradigms); O’Hear, chap. 3-4 (Falsification; Science and Non-Science)

Group Activity: Models and Paradigms

Presentation: Scientific Method (continued)

Day 4 Barbour, chap. 6 (Similarities and Differences); O’Hear, chap. 5 (Observation and Theory).

Group Activity: Religious Explanations

Presentation: Scientific Judgment

Day 5 O’Hear, chap. 6-7 (Scientific Realism; Probability)

Guided Discussion: Comparing Science and Religion

Presentation: Science and Scientism

## II. Some Historical Perspective: From the Medieval World View to Modern Science

Day 6 Barbour, chap. 1, pp. 1-17 (Physics and Metaphysics in the Seventeenth Century); Trusted, chap. 1 (The Ordered Cosmos).

Group Activity: Teleological Explanations

Presentation: The Medieval World View

Day 7 Barbour, chap. 1, pp. 17-32; Trusted, chap. 2-3 (Old Beliefs and New Ideas; Chaos).

Presentation: The Development of the Newtonian Universe

Day 8 Barbour, chap. 2 (Nature and God in the Eighteenth Century); Trusted, chap. 4-5 The Search for a New Order; The Grand Design).

Group Activity: Human Beings in a Newtonian Universe

Presentation: Philosophic Responses to Modern Science

Day 9 First Paper Due – Article Analysis

Trusted, chap. 6-7 (The Age of Reason; The Age of Experience).

Presentation: Philosophic Responses to Modern Science (Continued)

## III. From the Mechanistic Universe to Contemporary Physics

Day 10 Davies & Gribbin, chap. 1-2 (The Death of Materialism; Chaos and the Liberation of Matter); Barbour, pp. 181-184.

Video: Chaos and Complexity

Directed Discussion

Day 11 Davies & Gribbin, chap. 3 (The Mysterious Present; Interlude: Confessions of a Relativist); Trusted, chap. 8-10 (Problems: Energy and Either; Revolution; Physics and Metaphysics). Barbour, pp. 177-181.

Video: Relativity Theory

Day 12 Davies & Gribbin, chap 7 (Quantum Weirdness); Barbour, chap. 7 (Physics and Metaphysics), pp. 165-177.

Guest Presentation: Quantum Physics

Day 13 Davis & Gribbin, chap. 8 (The Cosmic Network).

Group Activity: The Nature of Physical Reality

Day 14 Midterm Exam

#### IV. The Physical World and Human Reality

Day 15 Barbour, pp. 184-194; Henley, chap. 1-2 (Prime Suspects; Insufficient Data); Polkinghorne, One World, chap. 6 (Levels of Description).

Group Activity: Alien and Artificial Life Forms

Discussion: What Does It Take To Be a Person?

Day 16 Henley, chap. 3, 6 (Pro Creation; Temporal Distortion); Davis & Gribbin, chap. 9 (Beyond the Infinite Future).

Group Activity: Determinism, Freedom, and Time Travel

Presentation: Are Human Beings Free?

Day 17 Henley, chap. 4-5 (To Beam or Not to Beam?; Personal Growth).

Group Activity: Transformation and Personal Identity

Discussion: What Is Needed for Personal Identity?

Day 18 O'Hear, chap. 8 (Scientific Reductions); John Hick, selection from Death and Eternal Life

Directed Discussion: Personal Identity and Life After Death

Day 19 O'Hear, chap. 9 (Science and Culture); Walter Stace, "Man Against Darkness."

Group Activity: Values in a Scientific Universe

Discussion: The Reality of Values

#### V. Cosmology and Evolutionary Theory

Day 20 Barbour, chap. 8 (Astronomy and Creation), pp 195-199; Davies & Gribbin, chap. 4-6 (The Universe At Large; The First One Second; ... And the Last).

Video: Big Bang Cosmology

Discussion

Day 21 Barbour, chap. 8, pp. 199-204; Ward, introduction, chap. 1 (Introduction; the Origin of the Universe).

Group Activity: Genesis 1-2

Directed Discussion: Interpreting Sacred Scripture

Day 22 Barbour, pp. 204-220; Ward, chap. 2-3 (Something for Nothing: A Dubious Deal; Is There Any Point? Where Is the Universe Going?).

Presentation: The Ideas of God and Creation

Group Activity: Cosmological Arguments and Anthropic Principles

Day 23 Davies & Gribbin, chap. 10 (The Living Universe); Barbour, chap. 3 (Biology and Theology in the Nineteenth Century); Ward, chap. 4 (Darwin and Natural Selection).

Group Activity: Is Evolution a Problem for Religion?

Discussion

Day 24 Ward, chap. 5-6 (The Metaphysics of Theism; The Elegance of the Life Plan); Dawkins, chap. 1-3 (Explaining the Very Improbable; Good Design; Accumulating Small Change).

Guest Presentation: Evolutionary Theory

Day 25 Barbour, chap. 9 (Evolution and Continuing Creation); Ward, chap. 7 (Evolution and Purpose); Dawkins, chap. 4-5 (Making Tracks Through Animal Space; The Power and the Archives).

Video: Evolutionary Development

Discussion of Ward and Dawkins

Day 26 Ward, chap. 8-9 (Brains and Consciousness; The Future of Evolution); Dawkins, chap. 6-7 (Origins and Miracles; Constructive Evolution).

Presentation: Neo-Darwinian and Post-Darwinian Approaches to Evolution

Discussion: Are We Looking at the Same Evidence?: The Role of Control Beliefs

Day 27 Yandell, chap. 11-12 (Arguments Concerning Nonmonotheistic Conceptions).

Guest Presentation: Nonmonotheistic Religions

## VI. Divine Action and Scientific Law

Day 28 Second Paper Due: Analysis of Ward and Dawkins

Barbour, chap. 12 (God and Nature)

Group Activity: Miracles

Presentation: Alternative Views of God and Nature

Day 29 Polkinghorne, Belief in God, chap. 3 (Does God Act in the Physical World?)

Group Activity: The Nature of Scientific Law  
Discussion: Quantum Physics, Chaos Theory, and Divine Action

Day 30 Ward, chapter 10 (Suffering and Goodness)

Group Activity: Evil and Divine Action

Discussion: Have We Changed Our Minds About Anything? What is the Value of Intellectual Inquiry?

Final Exam

Sample Group Activities:

Day 2 Activity: Observation and Theory

1. As you look around the classroom, you should be able to tell that there are other persons in the room.
  - A. Define what a person is.
  - B. According to the definition you have given in A, is there more to being a person than what you can detect with the senses (see, hear, etc.)? Explain.
  - C. Is it possible to observe that there are other persons in the room? Why or why not?
2. Suppose that you look across the room and see a chair, but when you walk over to sit in the chair, you feel nothing beneath you and fall to the ground. You get up and look, and sure enough you see a chair there, but the next time you try to sit down, you have a sensation like falling into a swimming pool. You get out and dry yourself off and then look to see a chair, but when you try to touch it, you get a sensation like putting your hand into a fire. Then the fire disappears and there is no chair to be seen. Assuming that your experiences are not hallucinations, did you see a chair? Explain.
3. Suppose that you had never seen a watch and that you have no concept of a watch. (You come from a culture where watches don't exist.) If you meet someone who is wearing a watch, what can you tell by observation about what the person is wearing? Is what you see a watch? Why or why not?
4. Imagine that you are looking at yourself in a mirror. Is what you are seeing yourself? Why or why not? Imagine that you are looking at the planet Saturn through a telescope. Does it take any theoretical assumptions to see the planet? Why or why not?
5. Is it possible to observe an atom? Why or why not? Can we know whether atoms exist? Explain.
6. When scientists make observations, are they only recording what they see, hear, etc.? Explain. Are scientific observations like the observations of nonscientists? Explain.

Day 6 Activity: Teleological Explanations

1. To give a teleological explanation is to explain something in terms of a purpose it fulfills. Give a teleological explanation for each of the following:

- A. Harry is holding an umbrella.
- B. Jennifer has put shampoo on her hair.
- C. Fred locks the handcuffs shut and throws the key in a canyon.
- D. Marjorie memorizes the Dow Jones stock exchange closings on a particular day.
- E. Bill kisses his ring.
- F. Sheila falls to her knees.
- G. Horace begins to cry.
- H. Mary knocks the books out of Edward's hands.
- I. Ted rolls in the mud.

2. Now see what kind of teleological explanation you can give for the following events:

- A. George is struck by lightning.
- B. Heavy rains come just after the planting season.
- C. In a train terminal the only vacant seat is next to a stranger that you eventually fall in love with and marry.
- D. When water is poured out, it goes down.
- E. Heat rises.
- F. Birds fly south in the winter.
- G. The heart pumps blood.
- H. You are almost run over by a truck.
- I. The sun rises in the east.

3. Some explanations are nonteleological. For example, you might explain why the birth rate in a particular town rose in some month without appealing to any purposes. However, sometimes we can give both teleological and nonteleological explanations for the same thing. Think of three examples of an event for which both teleological and nonteleological explanations are appropriate.

4. Would a nonteleological understanding of what an eye is be sufficient? Why or why not?

5. Suppose that someone asks why the laws of nature that we discover exist instead of some other laws. Is an answer to this question possible? Is the question a reasonable one? Why or why not?

#### Day 17 Activity: Transformation and Personal Identity

Consider each of the following cases. Does the person who existed before the described change still exist after the change? In which cases has a different person been produced? How can you tell?

1. Jane has suffered irreversible brain damage and will never recover consciousness. However, her body is being kept alive artificially.



2. Dick has developed an inoperable brain tumor that has produced major personality changes. He used to be mild mannered and friendly. Now he is violent and hostile.
3. Sally begins to behave in unusual ways and is diagnosed with Multiple Personality Disorder. One of her personalities (Betty) has no memory or knowledge of Sally and exhibits beliefs and behavior that are significantly different from Sally's previous beliefs and behavior.
4. John's behavior underwent a radical change when he had a religious conversion. His wife, a convinced atheist, says that he is not the person she married.
5. Gertrude develops total amnesia about her identity and her life.
6. Fred's brain is taken out of his body and discarded, and a brain that used to belong to George is placed in Fred's body.
7. Half of Fred's brain is removed.
8. Half of someone else's brain is combined with Fred's half-brain.
9. Linda is suffering from a disease that is expected to cause slow degeneration of her brain. Before this happens a physician who has developed a technique for duplicating the contents of brains makes an artificial copy of her brain and replaces the brain with the copy.
10. A scientist uses the process of duplicating the brain's contents to transfer the contents of Evelyn's brain to Melanie. The process erases the contents of Melanie's brain.
11. In a variation on the technique described in #10, the scientist stores the contents of a brain in a computer disk before making the transfer. If the contents are from Evelyn's brain, does Evelyn exist after the transfer? What about when the contents are on the disk, but not in a brain?
12. If the contents of Beverly's brain are transferred to an artificial body, is it Beverly?
13. If the contents of Beverly's brain are transferred to multiple bodies, is one of them Beverly?
14. Captain Kirk steps in the transporter, and someone who looks like Captain Kirk and thinks he is Captain Kirk appears on the planet.
15. A transporter accident produces two individuals, both claiming to be William Riker.

Day 28 Activity: Miracles

1. Suppose the Israelites are attempting to escape from Egypt. They are being chased by Pharaoh. When they arrive at the Sea of Reeds, a wind from the east blows the water enough for them to walk through the sea bed. When Pharaoh's chariots try to pursue, they are bogged down in the mud and some of them drown when the wind subsides. Would this be a miracle? Why or why not?

2. Suppose that there is such a thing as mental telepathy and that our current understanding of scientific law does not allow us to explain how it exists. Should we think of an event in which a mother learns of danger to her child through mental telepathy and rescues the child as miraculous, or should we view it as a natural phenomenon that we may one day be able to understand scientifically. Why?

3. Imagine that someone is diagnosed with terminal cancer. At some later point the tests show no cancer in the body, and the doctors have no explanation of why. Are there alternative ways to think about the meaning of this event? Explain.

4. Before modern technology the idea that a person could almost instantly communicate with someone on the other side of the planet might have been thought impossible. Is the question of whether something is miraculous relative to the state of a culture's (or individual's knowledge) at some point in time?

5. Could we know for sure that something we call a scientific law could not be broken? Why or why not?

6. Could an extraordinary event which displayed an evil pattern be miraculous? Why or why not?

7. What is the best way to define the term 'miracle'?