

## **SCIENCE AND THEOLOGY**

Institution: Pittsburgh Theological Seminary

Instructor: Michael Fuller

### **A DESCRIPTION OF THE COURSE**

A detailed breakdown of the material to be covered in the proposed course is given below. It deals briefly with the historical background to the present state of the sciences, and then covers a variety of topics currently being developed by scientists, such as quantum theory, chaos theory, cosmology, molecular biology, sociobiology and evolutionary theory. The challenge these provide to traditional understandings of God, the Cosmos and humankind will be addressed, and the positive contributions which they can make to the theological endeavour will also be brought out. It will be made clear that the theological viewpoint from which all these issues are being addressed is a Christian one, but varieties of understanding within the Christian paradigm will be discussed, and students will be encouraged to voice their own views. Where possible, attention will be drawn to the ways in which relationships between the sciences and Eastern religious traditions have been explored. The emphasis throughout will be on the development of the contemporary dialogue between science and theology. The ways in which each discipline can learn from the other will be examined, such as the possibilities of scientific ideas being “mined” for theologically useful ideas and analogies, and the ways in which religious traditions can act as loci for value systems which inform the progress of science. The ways in which some incompatibilities between the two disciplines remain will not be ignored. The vital importance of humility in such investigations will, we trust, be brought home to students through the emphasis throughout on the dynamic, open-ended nature of the investigations being undertaken, and the importance laid on their forming and expressing their own views in group discussions. The reading materials, it is hoped, will similarly provoke a variety of responses. The dialogues undertaken in class will, we hope, illustrate the dialogical nature of the discipline being studied. Publicity material will be produced to ensure that all students are aware of this course, and of its scope. Evidence from those attending the few lectures on science and theology currently offered in Edinburgh (as part of a course on apologetics) strongly suggests that this is an area of study which students find interesting and attractive. It is therefore believed that this will be a popular course amongst those towards whom it is aimed. We would expect enrollment numbers to be of the order of 10-15 students. The course will comprise two hour-long sessions per week for 18 weeks. It will consist of lectures and seminars, each of the latter requiring formal input from one or two students. Following the initial introductory lecture setting out the themes to be addressed and introducing the set books, the next 34 sessions will be divided into pairs. The first session of each pair will consist of a lecture and the second, after time has been allowed for reading, will be a student-led seminar. The facts that some students will have longer to prepare their seminars than others, and that there are variable quantities of material to be covered for each seminar, will be taken into account in assessing the seminars. The Course Directors will be available for discussions with the students who are preparing each seminar paper prior to

their delivering it. The final (36th) session will sum up the course and allow time for final questions.

## **ASSESSMENT AND COURSE CREDIT**

Input to the seminars will be assessed and will account for 25% of a student's final mark for the course, the remaining 75% being accounted for by an examination at the end of the year (except for non-theological students, who will be expected to submit two essays for assessment). This course will provide one seventh of the total number of credits required for a Bachelor of Divinity (hons.) degree.

## **SET TEXTS: GENERAL**

*Introductory:* M. Fuller, *Atoms and Icons*

J. Polkinghorne, *One World*

R. Stannard, *Science and Wonders*

These texts serve as broad introductions to the kinds of topics being discussed. It is hoped that students will find them helpful, but reading them is not an essential requirement of those undertaking this course.

*Core texts:* I. G. Barbour, *Religion in an Age of Science*

J. Hedley Brooke, *Science and Religion*

A. Peacocke, *Theology for a Scientific Age*

These more detailed texts form a more or less permanent backdrop to the topics under discussion. All students enrolled on this course will be expected to have engaged thoroughly with these books.

In addition to these set texts for the course as a whole, specific texts will be set for each of the topics covered, as indicated below. These texts will have been engaged with by those presenting seminars on these topics, and should also be read by any student expecting to answer an exam question on the subject dealt with in the seminar. The course is divided into four parts. The first examines the historical background to the perceived antagonism between science and religion (specifically, Christianity). The second looks at the literalist religious backlash against science. The third looks at the way in which approaches towards a dialogue between science and religion have arisen in the philosophical field, whilst the fourth looks at some issues in contemporary science which have also contributed to this dialogue.

The 36 sessions will cover the following topics.

**1) *Introductory lecture.*** This lecture will examine the popular understanding of religious belief as retreating before the advances of science. Various strategies for retaining a place for religious belief will be examined, including the “God of the Gaps” strategy. The question of whether or not “gaps” which science can never address truly exist will be addressed.

## **PART 1. THE CHALLENGE: HISTORY**

**2) *The Rise of Science.*** This lecture and seminar will address the background to the “Scientific Revolution” of the seventeenth and eighteenth centuries. An account of the origins of the late mediaeval world-view will be given, as will an account of the work of Archbishop Ussher. It will be suggested that the clash between Galileo and the Church of his day was an example of different paradigms colliding. The resulting “dethroning” of humankind from a central position in the cosmos will be examined, along with the resonances of that event in the ongoing relationship between theology and science.

**Set text:** M. Sharratt, *Galileo*.

**3) *Seminar: Was Galileo right? Justify your response.*** [The student(s) presenting this seminar will examine how Galileo reached his conclusions, and the criteria applied for their “rightness,” in the context not just of the present day, but also of the world which Galileo himself inhabited.]

**4) *Newton and empiricism.*** Newton’s work leading to his achievements in the *Principia* and *Opticks* will be discussed. Its consequences in offering a mechanical account of the universe will be examined, together with the question of how much this can explain. The consequences of materialistic, deterministic understandings of physical processes for belief in God will be examined, as will be the issue of how far can mechanistic views can go in explaining also biological and mental processes.

**Set text:** R. Westfall, *The Life of Isaac Newton*.

**5) *Seminar: What kind of God is consistent with Newton’s ideas?*** [The student(s) presenting this seminar should examine the consequences of a law-like understanding of the cosmos on the ideas which believers in God advance with regard to the actions of God in the world and in people’s lives.]

**6) *The impact of Darwinism.*** This lecture and seminar will examine the background to the theory of evolution in Darwin’s life and work, paying attention to their social context. Darwin’s ideas themselves will be presented. An account will be given of their championing by T. H. Huxley and others, and the motivations of these champions will be discussed in the context of Victorian England. Was religion per se threatened by evolutionary ideas, or simply its expression in the institutions of the day?

**Set text:** A. Desmond and J. Moore, *Darwin*.

**7) Seminar: What exactly are Darwin's ideas? How convincing do you find them?** [The student(s) presenting this seminar will examine the evidence presented by Darwin in support of his ideas, and the problems with evolution which they leave unsolved. The student(s) will be encouraged to reach their own conclusions regarding the validity of Darwin's theories. It is hoped that this seminar will raise questions, regarding such issues as the extension of Darwinian theory in various forms of biological determinism, which will be addressed more fully in later parts of the course.]

**8) Psychoanalysis: A Science of the Soul?** This lecture and seminar will look at Freud and the psycho-analytic movement, analysing its scientificity (or otherwise). Freud's ideas, posing a conscious challenge to religious belief, will be examined, as will Jung's more positive response to religion.

**Set texts:** S. Freud, *The Future of an Illusion*, and C. G. Jung, "The Spiritual Problem of Modern Man" in *Modern Man in Search of a Soul*.

**9) Seminar: Is religion a primitive, or infantile, phenomenon?** [The student(s) presenting this seminar will examine the bases of Freud's ideas about religion and assess the evidence presented in support of them. They will also examine Jung's approach as providing an alternative understanding of religious belief.]

**10) Reductionism.** This lecture and seminar will examine various ideas which have been advanced relating to the philosophy that reduces our understanding of entities to an understanding of the parts of which they are made. Different kinds of reductionism will be distinguished. The success of this view within many scientific disciplines will be noted, as will the theological consequences of so-called "nothing buttery."

**Set text:** R. Dawkins, *The Blind Watchmaker*.

**11) Seminar: Reductionism - How Far Can You Go?** [The student(s) presenting this seminar will be encouraged to reach their own conclusions regarding the appropriateness of the reductionistic approach to various levels of analysis of natural phenomena, and to discuss the theological consequences of their thinking.]

**12) The "new syntheses."** This lecture and seminar will examine the disciplines of sociobiology, genetics and molecular biology, and the accounts they give of humankind. The ideology allegedly inherent in such accounts will be discussed. Questions such as, How far is human behaviour attributable to our genes? will be addressed. The challenges to traditional religious understandings posed by such deterministic understandings of humankind will be examined.

**Set text:** R. Lewontin, *The Doctrine of DNA*.

**13) Seminar: How convincing do you find scientific explanations of human behaviour?** [The student(s) presenting this seminar will be encouraged to think through the consequences of biological reductionism, not least in terms of its account of religion.]

**14) *Artificial Intelligence.*** This lecture and seminar will ask whether computers will ever be able to rival human brains in their capacity to solve problems. It will ask questions such as: What is consciousness? Might a machine ever be able to experience it? What, if anything, is unique about the human mind? What are the consequences of the concept of Artificial Intelligence on our understanding of humankind as the unique conscious creation of God?

**Set text:** J. Puddefoot, *God and the Mind Machine.*

**15) *Seminar: Can a machine think?*** [The student(s) presenting this seminar will examine issues related to the defining of consciousness, and the applicability of that term to describing the operations of complex computers, as well as being invited to advance their own ideas with regard to the theological consequences of Artificial Intelligence.]

## **PART 2. THE REACTION**

**16) *Fundamentalism and biblical literalism.*** This lecture and seminar will discuss “non-integrative” reactions to the challenges of science - approaches that will deny the validity of scientific results which are believed to challenge religious ideas. It will examine the background and philosophy behind phenomena such as “creation science.”

**Set text:** S.J. Gould, *Hen’s Teeth and Horses’ Toes*, ch.5 (and further material currently being sought).

**17) *Seminar: Discuss the concept of Creation Science.*** [The student(s) presenting this seminar will be expected to discuss the pros and cons of aligning biblically-derived ideas in opposition to ideas derived from the natural sciences, and to come to their own conclusions regarding such a strategy.]

## **PART 3. THE RESPONSE: (I) FROM PHILOSOPHY AND THEOLOGY**

**18) *What is Science?*** This lecture and seminar will discuss the changes of perspective regarding science that have come about with the ideas of Karl Popper. The philosophies of induction and deduction will be examined, as will Popper’s criterion of falsifiability as the means of distinguishing between science and non-science.

**Set texts:** B Magee, Popper, chapters 1-5; W.H. Newton-Smith, *The Rationality of Science*, chapter III.

**19) *Seminar: What is a scientific fact?*** [The student(s) presenting this seminar will be urged to consider the ways in which “scientific” information differs from information put forward in other fields of human endeavor, such as theology, and to what extent these disciplines are similar in the way in which they assess information.]

**20) *The move from objectivity (i): science as a social activity.*** This lecture and seminar will assess movements towards an understanding of science that recognises it as a social

activity, carried out by a scientific community, against a background of funding constraints and potential misrepresentation in the wider community. The manners in which concepts of value may be introduced into science will be raised.

**Set text:** T.S. Kuhn, *The Structure of Scientific Revolutions*.

**21) Seminar: Scientific knowledge - Who decides?** [The student(s) presenting this seminar will be expected to give an assessment of the manners in which science advances, and to offer views regarding the rules of influences from outside the laboratory, including the influence of values deriving from religious systems.]

**22) The move from objectivity (ii): myths and models.** This lecture and seminar will address questions such as, How do science and theology use models to develop their subjects? How, if at all, do these models relate to what is “out there”? What are the rules of myth in the scientific and theological endeavours? The ideas of instrumentalist and realist understandings of science and other fields of human enquiry will be introduced.

**Set Text:** I. Barbour, *Myths, Models and Paradigms*.

**23) Seminar: How do you think about God? Explain yourself.** [The student(s) presenting this seminar will be encouraged to explore the images they find most helpful for thinking about God, and to give an account of the origins of those images and the ways in which they have been developed. They will also be expected to make comparisons between their thinking and that of scientists.]

**24) Is belief in God reasonable?** This lecture and seminar will examine the defence of Christian theism as a reasonable response to the world as we perceive it. They will assess the extent to which theistic belief can be based upon rational activity.

**Set text:** R. Swinburne, *The Existence of God*.

**25) Seminar: How convincing do you find logical arguments for the existence of God?** [The student(s) presenting this seminar will be required to give an account of rational defences of belief in God and their own assessment of such defences.]

#### **PART 4. THE RESPONSE: (II) FROM SCIENCE**

**26) The quantum revolution. This lecture and seminar will examine how the quantum world differs from the “macro-world.”** The erosion of deterministic ideas about physical processes will be discussed, with reference to Heisenberg’s Uncertainty Principle and to the Measurement Problem. The theological consequences of this move away from determinism will be pointed out. The use of quantum mechanics as a source of novel metaphors and analogies of interest to the theological endeavour will be considered, as will the idea that quantum uncertainty may offer a way in which God can interact with the world. Suggested parallels between the theories of contemporary physics and traditional Eastern religious thought will also be examined.

**Set texts:** J. Polkinghorne, *Reason and Reality*, esp. chapter 7: P. Davies, *God and the New Physics*, esp. chapters 1, 8-10.

**27) Seminar: *Does God play dice? If so, does God load them?*** [The student(s) presenting this seminar will be encouraged to explore the counter-intuitive findings of quantum physicists and the various ways in which they have been explained. They will then consider the theological consequences of these approaches to quantum reality.]

**28) *Chaos and Complexity.*** The insights of these new sciences into issues of predictability and of spontaneous ordering will be discussed. The theological consequences of these ideas as potentially offering an account of how non-deterministic behaviour can arise in deterministic systems (and the criticisms of this approach) will be covered, as will the theological consequences of self-ordering systems in the clues they offer to the origins of life.

**Set texts:** J. Gleick, *Chaos*, chapters 1-3, and S. Kauffman, *At Home in the Universe*, chapters 1-4.

**29) Seminar: *Discuss the theological implications of the Chaos and Complexity theories.*** [The student(s) presenting this seminar will be expected to discuss the deterministic and non-deterministic aspects of natural processes in the light of Chaos and Complexity theories, and to form a critique of the theological usefulness of these theories.]

**30) *Cosmology.*** This lecture and seminar will examine insights from cosmology regarding the origin and nature of the universe. The significance of the Anthropic Principle will be discussed, as well as the various ways in which that Principle has been formulated.

**Set text:** J. Leslie, *Universes*.

**31) Seminar: *Does the Anthropic Principle point towards a new Argument from Design?*** [The student(s) presenting this seminar will be required to summarise the arguments in Leslie's book and to give a personal assessment of them.]

**32) *Antireductionism.*** This lecture and seminar will examine new ways of looking at complex systems in terms of emergent realities, and the related phenomenon of "top-down" causation. The implications of such ideas in terms of their offering new insights to the theologian regarding God's relationship to, and interaction with, the universe will be considered.

**Set texts:** A. Peacocke, *Intimations of Reality, and Theology for a Scientific Age*, chapters 1-5, 9.

**33) Seminar: *Do antireductionist ideas suggest a new way for understanding God, and God's interaction with the world?*** [The student(s) presenting this seminar will be

required to assess the theological development of antireductionist ideas regarding the universe as being in some sense the “body” of God, and the possibility of “top-down” causation as offering a model for God’s interaction with the physical world.]

**34) *A new apologetic?*** This lecture and seminar will summarise much of the preceding material and re-assess the theological relevance of the findings of pre-twentieth century and contemporary science. The way in which contemporary apologetic might use science in addressing questions such as, How do theologians explain themselves in contemporary terms? and, Can contemporary theology utilise recent scientific insights? will be discussed. Parallels between such contemporary apologetic activity and that of the early Church will be examined. Are we simply engaged in an enquiry which has always been a part of the activity of the Christian Church?

**Set text:** Athenagoras of Athens, *Embassy*.

**35) *Seminar: Do you think that science can be of use to theology? Justify your answer.*** [The student(s) presenting this seminar will be expected to compare Athenagoras’s text, as an example of second-century apologetic, with contemporary attempts to give expression to Christian ideas in terms comprehensible to the majority of people versed in contemporary culture - informed as that culture is by the activity and findings of the natural sciences.]

**36) *Final Lecture.*** The final lecture will address any outstanding matters raised by the students, coverage of which time has not permitted earlier in the course. Further questions will be encouraged and, if possible, addressed. It is hoped that the course outline above meets the selection criteria stipulated in the John Templeton Foundation Science and Religion Course Program guide. It is believed that this proposed course is sound from a pedagogical perspective, and genuinely interdisciplinary in content and scope. It examines theories and methodologies in science and in theology; and it addresses “frontier issues,” looking at current issues in a variety of sciences as well as examining the science-theology relationship from historical and philosophical perspectives. The bibliography introduces the students to a number of important thinkers currently active in this field. It is hoped that the on-going, exploratory nature of this endeavour will come through clearly, and that the opportunity for students to express their own views and opinions will allow for the discussion of a variety of viewpoints.