**CORE 103: The Process of Change in Science Fall 2017**

Course 63524D MW 3:30 pm to 4:50 pm in THH 118

Professor Edwin McCann, mccann@usc.edu

Office: MHP 205F, mc. 0451

Office hours Mondays and Wednesdays, 2:30 pm to 3:15 pm

Quyen Pham, Teaching Assistant, lequyenp@usc.edu

Discussion 63525D F 8-8:50 VKC 106

Discussion 63526D F 9-9:50 VKC 106

The theme of our course is the (alleged) conflict between science and religion in the modern European and American context. We begin by studying the trial of Galileo, its background in the science, theology, and politics of the early seventeenth century, and its cultural reception and scientific and philosophical consequences. We’ll follow out the complex interplay between science, philosophy, and religion as it developed during the Scientific Revolution, and we’ll cap this part of the course with a consideration of David Hume’s withering attack on the design argument for the existence and providence of God. We then jump ahead from the eighteenth century to our own time. The current guise of the (alleged) conflict between science and religion is the controversy over evolution vs. creationism, which comes to a head in the context of the science curriculum for secondary schools. We’ll go back to 1859 and 1871, reading substantial excerpts from Charles Darwin’s epochal works *The Origin of Species* and *The Descent of Man.* We’ll bring the biology up to date with Ernst Mayr’s book *What Evolution Is*, and we’ll get a sense of what it all means from Daniel Dennett’s very influential book *Darwin’s Dangerous Idea: Evolution and the Meanings of Life*. In this book Dennett discusses the scientific status of the theory of evolution by natural selection, and explores how the Darwinian approach can be extended to provide understandings of such issues as the evolution of culture (the theory of memes), the evolution of mind and language, and the evolution of morality. We’ll further explore some of these applications as they figure in evolutionary psychology, and we’ll see some of the methodological shortcomings that plague most attempts at explanation in this field. With this background in place, we’ll tackle the creationism/evolution controversy head on, reading and evaluating a philosophical critique of creationism and then going to consider very influential and very lively debate between a philosophical proponent of evolutionary naturalism (Daniel Dennett again) and a staunch philosophical defender of theism and its attendant view, creationism (Alvin Plantinga). We end the course considering the ways in which the contest between evolution and creationism have played out in the U.S. courts, studying trial transcripts of 1925 Scopes Trial in Tennessee (also known as the ‘Monkey Trial’) and viewing the film *Inherit the Wind*, and tracing some of the history of subsequent court decisions down to, and including, the 2005 case Kitzmiller et. al. vs. Dover Area School District, the last major case addressing the question of whether what started out as creationism, evolved into creation science, and further evolved into the theory of intelligent design, is able to be included in public high school science curriculums without violating the 1st Amendment Establishment Clause. (The consistent answer from the courts: no.) Throughout the course we’ll be visiting, and revisiting, and revisiting again, the question whether there is a distinctive scientific methodology which gives scientific inquiry a special claim to rationality and truth.

**Books for the course**

1. Maurice A Finocchiaro, ed. and tr., *The Essential Galileo*, Hackett Publishing Co., ISBN: 9780872209374
2. Bertolt Brecht, *Life of Galileo*, tr. Rorrison and Willett, Bloomsbury Publishing, ISBN: 9780413577801
3. René Descartes, *Philosophical Essays and Correspondence* ed. Roger Ariew, Hackett Publishing Co., ISBN**:** 9780872205024
4. Peter Alexander, ed. *The Leibniz-Clarke Correspondence, with Extracts from Newton’s* Principia *and* Opticks, Manchester University Press,

ISBN: 9780719006692

1. David Hume, *Dialogues* and *Natural History of Religion* ed. J. A. C. Gaskin (Oxford World Classics) Oxford University Press, ISBN: 978-0199538324
2. Philip Appleman, ed. *Darwin (Norton Critical Editions)*, 3rd Edition, W. W. Norton and Co., ISBN: 9780393958492
3. Ernst Mayr, *What Evolution Is (Science Masters Series)* Basic Books, ISBN: 978-0465044269
4. Daniel C. Dennett, *Darwin's Dangerous Idea: Evolution and the Meanings of Life* Simon & Schuster, ISBN**:** 978-0684824710
5. David P. Barash and Judith Eve Lipton, *How Women Got their Curves and Other Just-So Stories*, Columbia University Press, ISBN: 9780231146654
6. Robert C. Richardson, *Evolutionary Psychology as Maladapted Psychology (Life and Mind: Philosophical Issues in Biology and Psychology)*A Bradford Book: MIT Press, ISBN**:** 978-0262514217
7. Niall Shanks, *God, the Devil, and Darwin: A Critique of Intelligent Design Theory***,** Oxford University Press, ISBN**:** 978-0195322378
8. Daniel C. Dennett and Alvin Plantinga, *Science and Religion: Are they Compatible? (Point/Counterpoint Series),* Oxford University Press, ISBN: 978-0199738427

Note: for items 3, 4, and 5 there are free versions available online that provide the relevant material, although generally not in the same editions or translations. There may be online versions of some of the other material, but I don’t know of any.

**Course requirements**

1. Regular attendance and participation in lectures and discussion sessions. Counts for 20% of the course grade.
2. Two 6-8 page critical/analytical papers. Each paper counts for 20% of the course grade.
3. An in-class essay format midterm exam covering material from the first part of the course. Counts for 20% of the course grade.
4. A take-home essay format final exam covering material from the whole course. Counts for 20% of the course grade.

**Schedule of readings and lectures:**

Note: listed readings should be completed by the date indicated.

Week one

M Aug 21 Introduction and overview of course; the Aristotelian worldview and the new mathematical/mechanistic natural philosophy of the seventeenth century

W Aug 23 The Copernican Revolution; the revival of atomism

Reading: excerpts from *The Sidereal Messenger* and *The History of Sunspots*, in Finocchiario pp. 45-84 and pp. 97-102; *Considerations on the Copernican Opinion, Parts I-III*, in Finocchiaro pp. 148-167; excerpts from *The Assayer* in Finocchiaro, pp. 179-189.

Week two

M Aug 28 Galileo on physics and Copernicanism; the crisis precipitated

Reading: excerpts from *Dialogue on the Two Chief World Systems*, in Finocchiaro, pp. 190-271.

Week of August 28 Evening event: screening of *Galileo* (1974) Joseph Losey dir. [Alternatively, a class reading of Brecht’s play *Life of Galileo*] Day, time, and room TBA

W Aug 30 Galileo’s trial

Reading: Letter to Castelli, Letter to the Grand Duchess Christina, Letter of Bellarmine to Foscarini, in Finocchiaro, pp. 103-148; Earlier (1615-1616) trial documents, in Finocchiaro, pp. 168-178; Later (1632-1633) trial documents, in Finocchiaro, pp. 272-294; Brecht, *Life of Galileo*

Week 3

M Sep 4: Labor day holiday; University holiday, no class today

W Sep 6 Descartes on scientific method and methodical skeptical doubt

Reading: Letter on Galileo, in Ariew, pp. 43-45; *Discourse on Method*, in Ariew, pp. 46-82 (focus on Parts Two (pp. 50-56) and Parts Four, Five, and Six (pp. 60-82)); Correspondence 1637-1641, in Ariew, pp. 83-96; *Meditations on First Philosophy* Letter of Dedication, Preface to the Reader, Synopsis, Meditations 1-2, in Ariew, pp. 97-113.

Week 4

M Sep 11 Descartes on the refutation of skepticism: the existence of God, the representative nature of ideas, the source of error, certainty by way of clear and distinct ideas, and the relation of mind and body

Reading: *Meditations on First Philosophy* Meditations 3-6, in Ariew, pp. 113-141; excerpts from *Principles of Philosophy* Part II, Prins. 1-25; Part III, Prins. 1-3; Part IV, Prins. 198-207, in Ariew, pp. 253-262, 267-272.

W Sep 13 Newton consolidates the revolution in physics and celestial mechanics; Leibniz’s objections to Newton’s metaphysical assumptions

Reading: extracts from the *Principia* and *The Opticks*, in Alexander, pp. 143-183; Leibniz-Clarke correspondence, Papers and Replies 1-3, in Alexander, pp. 11-35

Week 5

M Sep 18 Leibniz vs. Clarke (Newton) on absolute vs. relative space, time, and motion, gravity, and the principle of sufficient reason

Reading: Leibniz-Clarke correspondence, Papers and Replies 4-5, in Alexander, pp. 36-125.

W Sep 20 Hume’s attack on the design argument.

Reading: *Dialogues on Natural Religion*, Prologue and Parts 1-8, in Gaskin, pp. 29-89

Sunday September 24: First paper due at 11:59 p.m.

Week 6

M Sep 25 Hume on the argument *a priori*, the problem of evil, and skepticism

Reading: *Dialogues on Natural Religion*, Parts 9-12, in Gaskin, pp. 90-130

W Sep 27 The Darwinian Revolution; the evolution of species by means of natural selection

Reading: Selections from Darwin, *The Origin of Species* (1859), in Appleman, pp. 95-174.

Week 7

M Oct 2 The revolution gets personal

Reading: Selections from Darwin, *The Descent of Man* (1871), in Appleman, pp. 175-254.

W Oct 4 Darwinianism after the modern synthesis; Mayr on the history of life, population thinking, and adaptedness

Reading: National Academy of Sciences, ‘Evolution and the Nature of Science’, in Appleman, pp. 289-300; Peter Bowler, ‘The Evolutionary Synthesis’ in Appleman, pp. 319-325; James L. Gould and William T. Keeton with Carol Grant Gould, ‘How Natural Selection Operates’, in Appleman, pp. 373-376; Mayr, *What Evolution Is*, chaps. 1-7, pp. vii-157.

Week 8

M Oct 9 Mayr on the nature and evolution of species and human evolution; questions

Reading: Mayr, *What Evolution Is*, chaps. 8-12, Appendices A and B, pp. 161-282

W Oct 11 Midterm examination

Week 9

M Oct 16 Dennett on the basic structure of evolutionary explanation: species, algorithms, skyhooks vs. cranes

Reading: Dennett, *Darwin’s Dangerous Idea*, Preface, chaps. 1-5, pp. 11-123.

W Oct 18 Darwin on the analogy between evolutionary biology and engineering; spandrels, punctuated equilibrium, Lamarck, Teilhard, directed mutation.

Reading: Dennett, *Darwin’s Dangerous Idea*, chaps. 6-11, pp. 124-331.

Week 10

M Oct 23 Dennett on a science of memes; evolutionary accounts of mind and language

Reading: Dennett, *Darwin’s Dangerous Idea*, chaps. 12-15, pp. 335-451

W Oct 25 Dennett on evolution and morality and the future of Darwin’s dangerous idea

Reading: Dennett, *Darwin’s Dangerous Idea*, chaps. 16-18, pp. 452- 521.

Week 11

M Oct 30 Evolutionary psychology: Just-so stories and the explanation of human menstruation and invisible ovulation

Reading: Barash and Lipton, *How Women Got their Curves,* chaps. 1-4, pp. 1-115.

W Nov 1 Evolutionary psychology: breasts and other curves, the enigmatic female orgasm and the menopause mystery; conclusion.

Reading: Barash and Lipton, *How Women Got their Curves,* chaps 5-6 and Epilogue, pp. 117-189.

Week 12

M Nov 6 Are there explanations in evolutionary psychology?

Reading: Richardson, *Evolutionary Psychology as Maladapted Psychology* Introduction, chaps. 1-2, pp. 1-88.

W Nov 8 Evolutionary psychology of language and cognition; what makes for bad psychology and bad biology?

Reading: Richardson, *Evolutionary Psychology as Maladapted Psychology* chaps. 3-5, pp. 89-183.

Week 13

M Nov 13 Darwinism as the target of intelligent design (ID theory); the ID objection from thermodynamics

Reading: Eugenie Scott, ‘Antievolution and Creationism in the United States’, in Appleman, pp. 534-541; Thomas McIver, ‘Orthodox Jewish Creationists’, in Appleman, pp. 549-551; Harun Yahya, ‘Islamic Creationism’, in Appleman, pp. 551-553; Swami Srila Prabhupada, ‘A Hare Krishna on Darwinian Evolution’, in Appleman, pp. 553-55; Institute for Creation Research, ‘Tenets of Creationism’, in Appleman, pp. 555-557; Henry M. Morris, ‘Scientific Creationism’, in Appleman, pp. 557-564; Thomas J. Wheeler, ‘Review of Morris’, in Appleman, pp. 564-568; Phillip E. Johnson, ‘Darwin on Trial’, in Appleman, pp. 581-586; Eugenie C. Scott, ‘Review of Johnson’, in Appleman, pp. 586-592; Michael Behe, ‘Darwin’s Black Box’, in Appleman, pp. 592-601; Robert Dorit, ‘Review of Behe’, in Appleman, pp. 601-604; Michael Ruse, ‘Darwin’s New Critics on Trial’, in Appleman, pp. 605-612; National Academy of Sciences, ‘Frequently Asked Questions about Evolution and the Nature of Science’, in Appleman, pp. 617-623;

Shanks, *God, the Devil, and Darwin,* Introduction, chaps.1-3, pp. 3-134.

W Nov 15 ID misunderstands the nature of science; biochemical and cosmological objections.

Reading: Shanks, *God, the Devil, and Darwin,* chaps. 4-6, Conclusion, pp. 135-246.

Week 14

M Nov 20 Dennett vs. Plantinga on science and religion

Reading: Dennett and Plantinga, *Science and Religion: Are they Compatible?* chaps. 1-6, pp. 1-77.

W Nov 22 Thanksgiving recess 11/22-1126; University holiday, no class

Week 15

M Nov 27 Evolution, creationism, and the Establishment Clause: Scopes, Scopes II, Scopes III, . . .

Reading: Circuit Court of Tennesee, ‘The Scopes Trial’, in Appleman pp. 542-549; National Center for Science Education, ‘Seven Significant Court Decisions Regarding Evolution/Creation Issues’, in Appleman, pp. 574-576; explore further the links at <http://ncse.com/creationism/legal/scopes-trial-1925> (be sure to follow the link to <http://law2.umkc.edu/faculty/projects/ftrials/scopes/scopes.htm>) and <http://ncse.com/creationism/legal/major-cases>

Evening event:: screening of *Inherit the Wind* (1960, Stanley Kramer)

W Nov 29 Intelligent Design on trial, and the ID mascot, the flying spaghetti monster

Reading: <http://www.pamd.uscourts.gov/kitzmiller/docket.htm>, Opinion, Document #342; http://ncse.com/creationism/legal/padians-expert-testimony

Sunday December 3: Second paper due at 11:59 p.m.

FINAL EXAM: Monday December 11, 2:00 p.m.-4:00 p.m. (The take-home final exams will be due at 4:00 p.m. on Monday December 11, and will be submitted via Turnitin.)

**Course policies**

**Students with disabilities**

Any student who has registered with the office of Disability Services and Programs (DSP) and who has been identified by DSP as needing specific accommodations will gladly be afforded those accommodations. Please meet with the instructor as early as possible in the semester to discuss appropriate accommodations. I am very glad to work with you to tailor course requirements to your specific needs subject to considerations of general fairness for all students in the class.

**Academic integrity**

Be sure to familiarize yourself with Section 11 of *SCampus*

(<http://web-app.usc.edu/scampus/1100-behavior-violating-university-standards-and-appropriate-sanctions/>). If you are unsure about what constitutes a violation of academic integrity, please see the instructor or your Teaching Assistant. Any violation of academic integrity standards will result in a grade of ‘F’ for the course and a referral to Judicial Affairs, so please be very careful about this.

**Paper submission, deadlines and format**

Please submit your papers through the Turnitin function on Blackboard; your TA may ask you to directly submit to her an electronic version via e-mail and/or a printed hardcopy as well, but you must in any case also submit an electronic version through Blackboard. We will assess grade penalties for work submitted after the due date except in cases of documented extraordinary hardship or emergency situations. Please format your papers as follows: at least 12 point font, double-spaced, at least one inch margins all around, your name as it appears on the course roster on the top right hand corner of the first page; filename should be of the form ‘103 p<n>, <yourlastname>’; papers must be submitted in either .doc, .

**Classroom protocol**

Different students have different learning styles and manners, but all students (together with the lecturer) have a right to a classroom free of distractions. So: all use of electronic devices (laptops, tablets, cellphones, etc.) is banned during class time. The use of laptops and other devices in the classroom is not only rude and disrespectful to the lecturer, but it hinders learning for the user and for nearby students; see Sana, Weston, and Cepeda, ‘Laptop multitasking hinders classroom learning for both users and nearby peers’ in *Computers and Education* Vol. 62 (2013) pp. 24-31.  If you have become accustomed to taking notes on a laptop or tablet and are concerned that the device ban will adversely affect your note-taking, you should read this short article, which describes studies showing that learning and comprehension are enhanced by note-taking by hand as opposed to transcription on a laptop: http://www.sciencedaily.com/releases/2014/04/140424102837.htm

**Communication**

We will strive to respond promptly to your e-mail inquiries, comments, etc. Given the volume of e-mail we receive daily, it will help us if you will begin the subject line of your messages with ‘103.’ Examples: ‘103 request for a meeting <yourlastname>’ or ‘103 question about the lecture <yourlastname>’ Email messages lacking a subject line in this format may not be identified and answered.