

Einstein in an Age of Conflicts

HIS 350L unique# 39335

Fall 2011, TTh 3:30-4:50PM

classroom: GAR 2.112

Professor: Dr. Alberto A. Martínez

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office hours: TTh 11:30-12:20 & by appt.

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Course Description:

While eccentric physicists overturned fundamental scientific concepts, Europe was torn apart by wars of unprecedented scale. This history course analyzes these developments, examining the rise of the theories of relativity and quantum mechanics in the stage of international political upheavals. Following the life and work of Albert Einstein, the course focuses on conceptual developments and intellectual conflicts (mainly from the 1880s through the 1940s). It also studies the lives of physicists such as Max Planck, Werner Heisenberg, and J. Robert Oppenheimer, in the context of changing cultural and political conflicts. The material will be understandable even to students with no significant background in physics. Among the questions that we will cover are the following:

- How did relativity and the quantum clash with earlier conceptions of nature?
- Why did physics become so apparently difficult to understand?
- How did Planck navigate scientific success, duties, and tragedy as he rose in society?
- How did Einstein conceive of the special theory of relativity?
- Did Einstein's first wife secretly collaborate in his works?
- Did the intellectual climate of post-war Germany lead physicists to change ideas about nature?
- In Europe and America, how did scientists and politicians confront international catastrophe?
- Why did Einstein criticize quantum mechanics?
- How did religion relate to developments in physics?
- Did German physicists such as Heisenberg contribute to Nazi projects?
- How were the academic and social orders affected by the development of nuclear weapons?

We will read and discuss various kinds of materials: biographies, original scientific papers, manuscripts, personal recollections, letters, accounts by historians, physicists' essays, popular science nonsense, and even secret transcripts of controversial conversations. The assigned readings will be worthwhile, but not definitive. That is, just because I assign something for reading that does not mean that it is the best treatment of the given subject. Instead, it means mainly that the document at the very least involves issues that are well worth discussing. I will try to ensure that every class is both instructive and entertaining. This course will not be a monologue; there will be plenty of opportunity for your participation, and you are encouraged and required to participate. From the assigned readings, each student will choose a day to present in class. Each presentation may last up to 25 minutes, and will involve also our comments.

Required Readings: available at the UT Co-op:

- Jürgen Neffe, *Einstein: A Biography*, Johns Hopkins University Press, 2009.
- John Heilbron, *The Dilemmas of an Upright Man. Max Planck and the Fortunes of German Science*. Harvard University Press, 2000.
- Additional readings will be posted on Blackboard: <https://courses.utexas.edu>, or distributed in class, plus, each student will research other reading selections, especially primary sources.

The main required readings are Neffe's biography of Einstein and Heilbron's biography of Planck. The class calendar includes a schedule of days in which we will discuss sections from each of these books.

You are required to do all such readings before class, or you will lose points in the course. Our discussions will use these readings as starting points from which to formulate questions, to carry out research by finding additional sources to try to answer such questions. I will expect that you take the initiative to often find and present particular information; if not, I will specify additional readings or questions for research.

Attendance Policy: Attendance is required. The material covered in class is not identical to the material in the books, so you would easily be lost if you do not attend. Sometimes I will correct claims that appear in the readings. Every day, sometime after the class has begun, we will pass out an attendance sheet for you to sign-in. If you do not sign in, you will be counted as absent. Every unexcused absence will reduce your attendance score by 0.5 points, up to a maximum of 10 course points. Notice of an absence for medical reasons should be submitted promptly, for consideration. You have one courtesy absence with no penalty; and a +0.5 for perfect attendance.

Course assignments

You'll be required to complete several writing assignments. There will be **Reaction Essays** (500 words each) in which you will critically respond to material covered in class. There will also be a **Research Paper** (2500 words) where you will pursue a topic of your choice by finding and using appropriate materials from the library, both primary and secondary sources. You will have opportunities to edit and rewrite your work, and to read other students' papers and give them peer review feedback. There will be a few **Reading Confirmation Quizzes**, which can take place on any day. Moreover, all students will be expected to take a **Subject Comprehension Exam**, designed to test the extent to which you have followed, engaged, and learned from the topics discussed in class and in the readings.

The class will be conducted as a discussion; attendance and participation are essential.

This course carries a **Writing Flag**. Writing Flag courses are designed to give students experience with writing in an academic discipline. In this class, you can expect to write regularly during the semester, complete substantial writing projects, and receive feedback from your instructor to help you improve your writing. You will also have the opportunity to revise one or more assignments, and to read and discuss your peers' work. 65% of the final grade will be based on written assignments.

GRADING: 100-93 = A, 92-90 = A-, 89-87 = B+, 86-83 = B, 82-80 = B-, 79-77 = C+, 76-73 = C, 72-70 = C-, 69-67 = D+, 66-63 = D, 62-60 = D-, 59-0 = F. The distribution is as follows:

Class participation & Presentation	15%
Writing Assignments & Quizzes	30%
Subject Comprehension Exam	20%
Final Research Paper	35%
minus absences	- 0.5 course points per unexcused absence.

The Course Schedule is attached. Work turned in late without an extension negotiated at least a week in advance will be penalized one full letter grade the first day late. University policies on plagiarism and academic dishonesty will be enforced.

Upon request, the University of Texas provides appropriate academic accommodations for qualified students with disabilities. For more information, contact the Division of Diversity and Community Engagement, Services for Students with Disabilities 471-6259.

Class Calendar, Spring 2011

required readings; others to be assigned

Aug.25 Th	Introduction	
Aug.30 T	Neffe, "Preface," "Immortal," "Second Birth," pp. ix-x, 3-18	
Sept. 1 Th	Heilbron, "Establishing the World Picture" pp. 1-27; Mach, "Mechanics," pp. 223-233	
Sept.6 T	Neffe, "How Albert Became Einstein" pp. 19-37; Schopenhauer, excerpts	
Sept.8 Th	Neffe, "A New Era" pp. 38-48; Poincaré, "The Measure of Time" pp. 223-234	
Sept.13 T	Neffe, "Dwarfs and Giants" pp. 49-70	Reaction Essay 1 due.
Sept.15 Th	Neffe, "Burden of Inheritance" pp. 71-85, Poincaré, "Force," 92-99	
Sept.20 T	Neffe, "Elsa or Ilse" pp. 86-107; Martínez, "The Case of Einstein's Wife," 49-56	
Sept.22 Th	Neffe, "Miraculous Path" pp. 108-125; Martínez, "Discovery and Invention" 260-285	
Sept.27 T	Heilbron, "...Against Mach," pp. 44-60; Einstein, "Relativity," pp.1-35	
Sept.29 Th	Neffe, "Squaring the Light," pp. 126-150	
Oct. 4 T	Heilbron, "Enthusiastic Relativist" pp. 28-43, 114-122	Reaction Essay 2 due.
Oct. 6 Th	Neffe, "Why is the Sky Blue," pp. 151-167; Kuhn, "Revolutions," pp. 7-21.	
Oct.11 T	Neffe, "Dear Boys," pp. 168-205	
Oct.13 Th	Neffe, "General Relativity," pp. 206-230	
Oct.18 T	Neffe, "Lambda Lives," "Spacetime," pp. 231-251	
Oct.20 Th	Neffe, "Germany, Politics," pp. 252-288	
Oct.25 T	Heilbron, "International..." pp. 100-113,122-128	Research Paper due, 1st version.
Oct.27 Th	Neffe, "Not a Tiger," pp. 289-309	
Nov. 1 T	Neffe, "A Jew Named Albert," pp. 310-324	
Nov. 3 Th	Neffe, "Quantum Theory," pp. 325-349	
Nov. 8 T	Cassidy, "Heisenberg," 106-112; Heisenberg, "Fresh Fields," pp. 70-81	
Nov.10 Th	Heilbron, "Copenhagen" pp. 128-148; Heisenberg, "Understanding" pp. 29-34	
Nov.15 T	Neffe, "Unified Theory," pp. 350-358	Reaction Essay 3 due
Nov.17 Th	Neffe, "Einstein's America," pp. 359-378	
Nov.22 T	Heilbron, "In Shipwreck" pp. 149-196	
Nov.24 Th	Thanksgiving	
Nov.29 T	Neffe, "Atomic Bomb," pp. 379-403	Research Paper due, last version.
Dec. 1 Th	Farm Hall transcripts; Heilbron, "In Shipwreck, Afterword" pp. 197-217	
Dec. 8 Th	* FINAL EXAM * during finals week. 9:00AM – 12:00	Place to be announced