PHIL 20604 Fall 2019 Prof. Don Howard
Modern Physics and Moral 308 Malloy Hall
Responsibility Tel: 631-7547
TTh 11:00-12:15 dhoward1@nd.edu
625 Flanner Office Hours: TTh 12:30-1:30

Texts: Michael Frayn. *Copenhagen*. New York: Anchor, 2000.
Robert Jungk. *Brighter than a Thousand Suns: A Personal History of Atomic Scientists*. New York: Harcourt Brace, 1970.
Russell McCormmach. *Night Thoughts of a Classical Physicist*. Cambridge, MA: Harvard University Press, 1991.
Sylvan S. Schweber. *In the Shadow of the Bomb: Bethe, Oppenheimer, and the Moral Responsibility of the Scientist*. Princeton, NJ: Princeton University Press, 2000.

Requirements: There will be three components in the computation of your final grade for the course:

(1) ***Discussion Papers*** (60 %). Each student will be required to submit three discussion papers, each a minimum of 1,500 words, or, roughly, five pages, on topics to be worked out in consultation with the instructor. Each of the three discussion papers will be worth 20 % of the final course grade. Papers will be graded on the basis of both content and mechanics, the latter counting for approximately 20% of the grade on each paper.

(2) ***Journals*** (25 %). You will be required to keep a journal to be used primarily to record your critical reactions to the assigned readings. At a minimum, you should write a one-page (≥300 words) critical response to each reading assignment, though you are encouraged to write more, taking advantage of this opportunity to record your thoughts on any topic related to the course and the readings. Journal entries will be graded on a random, unannounced basis several times over the course of the semester. In addition, the entire journal will be collected at mid-term and at the end of the semester so that I can check to be sure that all required entries are included. You will submit your journal entries through the Sakai page for this course, creating a "blog" entry for each of the reading assignments. (Be sure to remember to check the option "**Only site administrators and I** can see this entry" and to "publish" your entry.) You will be graded rigorously on the extent to which you use your journal, the minimum of one page (300 words) per reading being strictly enforced. But it will be the quality of thinking manifest in your journal that will chiefly determine your grade. For more on how to keep a good journal, see the extra handout on that topic.

(3) ***Class Participation*** (15 %). The remaining fifteen percent of your final grade will be determined on the basis of the quality and extent of your enthusiastic and constructive participation in class discussion.

One-minute Papers: Every class session will end a few minutes early to permit you to write a so-called "one-minute paper," in which you will write no more than two- or three-sentence answers to two questions: (a) What was the most important point covered in today's class? (b) What issue or question was left most unclear in your mind at the end of today's class? These one-minute papers will be required of every student at the end of every class session and will be collected at the end of class, but they will not be graded.

Attendance: No more than two unexcused absences will be permitted during the semester; for every additional unexcused absence, the student's final course grade will be reduced by one step on a plus/minus basis. Thus, for example, for a student with three unexcused absences, a final grade of B+ becomes a B, and for a student with four unexcused absences, a final grade of B becomes a C+. A student more than fifteen minutes late for class is assumed to be absent. If you must miss a class for any reason, be sure to let me know beforehand, or as soon after the fact as possible, so as to enable me to determine whether or not to excuse the absence. I promise to be generous in allowing excused absences for legitimate purposes.

Schedule:

Date:	**Topic:**	**Readings:**
27 Aug.	Introduction to the Course	
	The Classical World View and the Revolutions in Physics in the Twentieth Century	
29 Aug.	Mechanics, Thermodynamics, and Electrodynamics in the 19th Century	
03 Sep.	"The Town" and "The Study"	McCormmach, 1–50.
05 Sep.	Relativity and Quantum Mechanics in the 20th Century	
10 Sep.	"The Institute" and "The World City"	McCormmach, 51–121.
12 Sep.	"The World" and "The Mountains"	McCormmach, 122–157.
17 Sep.	"On the Beach" - Movie	Stream online.
	The Atomic Bomb and Its Aftermath	
19 Sep.	Physics between Two Wars and the Discovery of Fission	Jungk, pp. 3–70.
23 Sep.	***First Discussion Paper Due***	
24 Sep.	The Manhattan Project	Jungk, pp. 71–123.
26 Sep.	J. Robert Oppenheimer	Jungk, pp. 124–155.
01 Oct.	What Did the Germans Know? And Early Opposition	Jungk, pp. 156–190.
03 Oct.	Dropping the Bomb	Jungk, pp. 191–220.
08 Oct.	The Postwar Campaign	Jungk, pp. 221–259.
10 Oct.	The Russian Bomb and the H-Bomb	Jungk, pp. 260–312.
15 Oct.	Oppenheimer and McCarthy	Jungk, pp. 313–341.
17 Oct.	"The Day after Trinity" - Movie	Stream online.

21-25 Oct.	**Fall Break**	
	Copenhagen	
29 Oct.	"Copenhagen" - Play and Movie	Frayn, pp. 3–94. Stream online.
31 Oct.	Postscript: Heisenberg and the Bomb	Frayn, pp. 95–132.
05 Nov.	"Fail-Safe" - Movie	Stream online
	The Moral Responsibility of the Scientist	
07 Nov.	What is Englightenment?	Schweber, pp. 3–41.
11 Nov.	***Second Discussion Paper Due***	
12 Nov.	J. Robert Oppenheimer	Schweber, pp. 42–75.
14 Nov.	Hans Bethe	Schweber, pp. 76–114.
19 Nov.	The Challenge of McCarthyism	Schweber, pp. 115–148.
21 Nov.	Nuclear Weapons	Schweber, pp. 149–177.
26 Nov.	On Science and Society	Schweber, pp. 178–186.
28 Nov.	***Thanksgiving Holiday***	
03 Dec.	"Dr. Strangelove" - Movie	Stream online
	Nuclear Weapons Today	
05 Dec.	Nuclear Proliferation: Iran and North Korea	
10 Dec.	The New Nuclear Arms Race: Russia and the United States	Wellerstein, "America's Nuclear-Weapons Policy Isn't What You Think — It's Much Worse."
12 Dec.	"The Day After" - Movie	Stream online.
19 Dec.	***Third Discussion Paper Due***	