

The Physicists and the Bomb
Course Information
Fall Term, 2000

Course number(s)	RC NatSci/Physics 214
Time	1:00-2:30 Mon and Wed
Place	24-26 Tyler, East Quad.
Instructor	T. M. Sanders
Office hours	Tue, Wed 3-4 and by app't.; 251 West Hall
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Texts	Rhodes <i>Making of the atomic bomb</i> [1] Rhodes <i>Dark sun</i> [2] Holloway <i>Stalin and the bomb</i> [3]
Recommended	Wolfson <i>Nuclear choices</i> [4]

There is a WWW [Home Page](http://abomb.physics.lsa.umich.edu/214/) for the course at
<http://abomb.physics.lsa.umich.edu/214/>

“The Physicists and the Bomb” divides into three parts.

1. “The Gathering Storm” (the title of the first volume of Winston Churchill’s history of the Second World War):

We will devote the first two to three weeks to the history and content of the science leading from the discovery of X-rays (1895) to Nuclear Fission (1938-39), the process utilized in Nuclear (“Atomic”) bombs and power-generating nuclear reactors. We will also discuss European political developments in the first part of the twentieth century, leading to the rise of fascism and nazism, two world wars, the increasing use of weapons of mass destruction, attacks on civilians, the involvement of scientists with the military, and the exodus of (among others) scientists from Europe on the eve of the Second World War.

Primary readings for this part of the course will Part I of *Nuclear choices* (pp. 1-118) and Part One (pp. 1-275) of *The making of the atomic bomb*, as well as the class notes and Web pages.

2. The Atomic Bomb and the Second World War:

We will spend the next several weeks examining the Anglo-American nuclear weapons effort, its organization, the technical problems and how they were solved, the political decisions involved in organizing the effort, in deciding to drop the Bomb on Japan, and the effects of the Bomb—physical, human, environmental, and political.

For this section of the course, we will draw primarily on *The making of the atomic bomb*, which concludes with the dropping of the atomic bombs on Japan.

Since the appearance of Michael Frayn’s drama *Copenhagen*[5] first in London, then in New York, there has been increased interest in the German wartime atomic effort. We will consider the history, personalities, and the play.

We will then devote some time to the Soviet nuclear effort, and the role played by espionage. The fall of the USSR has produced a great deal of new information on these subjects, treated in splendid books by David Holloway [3] and Richard Rhodes [2], both now available in paperback editions. Both cover events in the USSR and the importance of espionage very completely. Holloway is a political scientist, and treats Soviet politics more thoroughly. Rhodes, on the other hand, covers the American hydrogen bomb and American Cold War politics (and policies) in more detail.

3. Living in the Nuclear Age:

In the remainder of the course, we will consider the post World War II era, in which we have lived with the Bomb—first just an American weapon, then Soviet, British, French, Chinese, Indian, Pakistani. Now, presumably, the capability of nuclear weapons is rather widespread.

Nuclear power, as a source of electricity, has passed from the postwar phase (when it was predicted that “Electricity will be too cheap to meter”) to our present state of general pessimism following Three Mile Island and Chernobyl. Some countries, such as France and Japan remain committed to nuclear power.

The era of the American monopoly saw proposals for both national and international control of nuclear materials and weapons. With the announcement of the first Soviet nuclear explosion (1949) and the revelation of spying in the Atomic establishment, new urgency was attached to the development of more powerful weapons (the “Super” or H-Bomb) and the pursuit of subversives. In this period, Senator Joseph McCarthy flourished, and J. Robert Oppenheimer was charged, tried and convicted as a security risk. The arms race escalated further with the Soviet and American explosions of Thermonuclear (hydrogen) “devices”, and the launching of Sputnik (1957). The latter led to development of ICBMs, MIRVing, etc.

Our topic continues to be in the news. The Air and Space Museum at the Smithsonian and the US Postal Service had to modify plans to mark the 50th anniversary of the end of the second world war and the dropping of atomic bombs on Japan. Proliferation of nuclear weapons has been newsworthy in North Korea, Iraq, and Iran, and in nuclear testing in the Pacific by France. The nuclear powers have now signed (but not ratified) a Comprehensive Test Ban treaty. There are continuing controversies about “stolen nuclear secrets.”

Many (but not all) of these matters are the subject of Parts II and III of *Nuclear choices*, which concern policy options for the nuclear age.

Grading, papers, tests

There will be quizzes at the end of each section of the course. Each student is expected to write a research paper (length approximately 10 pages), which will develop in stages:

1. Proposed topic and bibliography
2. Paper draft
3. Oral presentation

4. Final paper

Participation in class discussion and the oral presentation will be considered in grading. Due dates are listed on the [schedule](#).

Citations

- [1] Richard Rhodes. *The making of the atomic bomb*. Simon and Schuster, New York, 1986. QC773 .R461 1986. [2](#)
- [2] Richard Rhodes. *Dark sun : The making of the hydrogen bomb*. Simon & Schuster, New York, 1995. UG 1282 .A8 R461 1995. [2](#), [3](#)
- [3] David Holloway. *Stalin and the bomb : the Soviet Union and atomic energy, 1939-56*. Yale, New Haven, CT, 1994. UA 770 .H6321 1994 (GRAD). [2](#), [3](#)
- [4] Richard Wolfson. *Nuclear choices : a citizen's guide to nuclear technology*. MIT, Cambridge, MA, revised edition, 1993. TK 9145 .W591 1993. [2](#)
- [5] Michael Frayn. *Copenhagen*. Methuen Drama,, London, 1998. 822.8 F846cn. [3](#)