

# **The Manhattan Project – Background, Personalities and Problems**

## **Description:**

The Manhattan Project to engineer and develop the first atomic bomb and bring an end to World War II was, perhaps the greatest assemblage of scientists and engineers in history. In a remarkably short period of time and under extreme security this group was tasked to solve scientific problems that later would impact all of humanity even after the war was over.

Many of the participants in the project had already established their places in scientific history and were driven by the challenge and/or by patriotism. For the younger participants the project provided an unfettered environment for research that would shape the remainder of their careers.

This course will explore significant milestones in atomic and nuclear physics in the early 20<sup>th</sup> century that laid the scientific foundation for this project. It will also examine the prior work that brought distinguished scientists (e.g., Robert Oppenheimer, Niels Bohr, Hans Bethe, Edward Teller, Ernest Lawrence, John von Neumann, etc.) to the effort and the renowned scientists (e.g., Richard Feynman, Glenn Seaborg, Luis Alvarez, John Archibald Wheeler, Wolfgang Panofsky, etc.) whose futures careers were influenced by it.

Described will be the bureaucratic entanglements that were encountered to “get the project off the ground” and the huge construction projects required to establish facilities (e.g., Los Alamos, Oak Ridge, Hanford, the Met Lab at the University of Chicago, etc.) across the United States. And finally, the course will include a description of the unprecedented scientific, engineering and ethical problems the team faced in the design, testing and execution of “the gadget.” The course will attempt to present a balanced mixture of the history and science that defined the beginning of the nuclear age.

## **Draft Syllabus:**

### **Week 1:**

- Lise Meitner, Otto Hahn, Otto Robert Frisch and the discovery of nuclear fission

- Leo Szilard (perhaps the “true father of the atomic bomb”?) and his persistence in bringing the science and potential of nuclear weapons to government officials
- The infamous letter from Albert Einstein to President Roosevelt

#### Week 2:

- The early work by British scientists towards an atomic bomb (“Tube Alloys”)
- President Roosevelt, Vannevar Bush, James Conant (and other) and the establishment of an American atomic bomb project
- General Leslie Groves and the establishment of the Manhattan Project
- The beginning of scientific recruitment and development of project facilities

#### Week 3:

- The selection of Robert Oppenheimer of the project director
- The selection of Los Alamos
- The building of the Manhattan Project “Dream Team”
- The functions and responsibilities of each of the Manhattan Project facilities (especially Los Alamos)

#### Week 4:

- Scientific milestones in the Manhattan Project (e.g., Enrico Fermi and the first reactor, Ernest Lawrence and cyclotron uranium isotope separation, Glenn Seaborg and the discovery of plutonium, bomb design models, etc.)
- Life at Los Alamos, Oak Ridge and Hanford

#### Week 5:

- The site selection for the first atomic bomb test
- The Trinity test of the first atomic bomb

#### Week 6:

- The decisions surrounding the use the bomb against the Japanese
- Public and private reactions to the use of the atomic bomb
- An assessment of German and Japanese efforts to develop an atomic bomb
- The end of the Manhattan Project and its lasting impact

## **Course Execution:**

In addition to lectures, the presentation methods used in this course include:

- Lecture slides and handouts
- Online links
- Video
- Bibliography and reference list