Science and technology do not occur in a vacuum; they are influenced by society, and by the social sciences, humanities, and arts. This interaction has occurred throughout the history of society. Science, Technology and Society (STS) are a field of interdisciplinary research into the interactions between the three areas. The basic aim of undergraduate STS education is to develop more responsible citizens that can make effective economic and political choices in our complex society. This course will deal with the use of mineral resources and fuels by our society and how the use of these resources has benefited and shaped society.

**Philosophy:** The Earth and its resources is an interesting and very enjoyable subject. I will serve as your guide, leading you through some of the highlights and around some of the pitfalls. When we get to the end of the class, I hope to have given you an appreciation of how important mineral resources are to society and how the use of these resources has modified society. These are very complex subjects that will help you better understand some current political debates.

**Objectives:** When you get through with this course, you will be expected to understand some of the current problems involving land use and the competition for resources. For example, you will be expected to know both the boomster and the doomster side of the argument on whether we are using up all of our natural resources. You will be expected to know something about the exploration process and why some mineral resources and/or fuels are concentrated in some geographic regions and not others. You will also be expected to know that mineral resources and fuels need to be processed before the consumer can use them. You will be expected to know some of the history of how society first learned to use metals.

**Supplemental Reading:** A wide range of books on geology are available in you are interested in pursuing some aspects of the subject in more detail. A few titles are listed here to get you started. These books are in the library.
*Gemstones for Everyman*, by Anderson


*Earthquakes, Science and Society*, by Brumbaugh

*Minerals: Foundations of Society*, by Dorr and Paty

*Ore Geology and industrial minerals: an introduction*, by Evans

*Annals of the Former World*, by McPhee

*Roadside Geology of Pennsylvania*, B. Van Diver

**Grading:** Grades will be based on two mid-semester exams (30% each and a final exam (30%). There will also be some in-class discussions and a take-home exercise (10%). The exams will be multiple-choice. The final exam will be cumulative. There will be a chance for extra credit.

**Attendance:** Attendance will be taken to help me learn names and to move a student to a higher grade if he/she is on the borderline between two grades.

**Academic Integrity:** All students are expected to act with civility and personal integrity. They should respect other student’s dignity, rights and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts. An environment of academic integrity is requisite to respect for self and others and a civil community.

Academic integrity includes a commitment to not engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another person’s work as one’s own, using internet sources without citation, fabricating field data or citations, “ghosting” (taking or having another student take an exam), stealing examinations, tampering with the academic work of another student, facilitating other student’s acts of academic dishonesty, etc.

Students charged with a breach of academic integrity will receive due process and, if the charge is found valid, academic sanctions may range, depending on the severity of the offense, from F for the assignment to F for the course.

The University’s statement on academic integrity, from which the above statement is drawn, is available at [http://www.psu.edu/dept/oue/aappm/G-9.html](http://www.psu.edu/dept/oue/aappm/G-9.html)

**Class Schedule**

Section A: The History of Metal Use

Aug. 26 Introduction and course outline
Aug. 28  A brief review of materials and metals; an introduction to geologic time and to human time; an introduction to the technology of Stone Age cultures
Suggested Reading- Chapter 1 in Dorr and Paty

Sept. 2  Minerals and chemistry; bonding; arrangement of atoms in a mineral and how that can affect mineral properties.

Sept. 4  What do mineral deposits represent? An overview of mining and mineral exploration
Suggested Reading - Chapters 2 and 3 in Dorr and Paty

Sept. 9  From stone to copper; How man learned to use metals; The Bronze Age

Sept. 11  Video on learning to use copper and bronze

Sept. 16  Bronze gives way to iron; Swords and plowshares; Learning how to make iron; Differences from bronze

Sept. 18  Video on change from bronze to iron

Sept. 23  Driving forces for the industrial revolution; The Black Death, English ship building, the 17th Century “energy crisis”; solving the energy crisis

Sept. 25  Review session

Sept. 30  First Mid-Term

Section B: Developments that encouraged the use of metals

Oct. 2  More on the industrial revolution; water in the mines; improvements in transportation; interchangeable parts

Oct. 7  Discussion

Section C: Use of other mineral resources

Oct. 9  What are industrial minerals?
Suggested Reading - Chapter 5 in Dorr and Paty
Minerals use exercise

Oct. 14  More on industrial minerals

Oct. 16  World population and resource consumption; the debate between the doomsters and the boomsters
Suggested Reading - Chapter 5 in Dorr and Paty
Class Schedule (Cont’d)

Oct. 16 Section D: Energy and Society

Oct. 21 The effect of technology on resource availability
Oct. 23 An overview of the energy industries; electrical, oil exploration and refining; natural gas
Oct. 28 Review session
Oct. 30 Second mid-term exam
Nov. 4 The oil industry
Nov. 6 The formation of coal and oil
Nov. 11 Alternative energy sources; Problems and advantages of each
Nov. 13 Alternative energy sources; Problems and advantages of each
Nov. 18 Discussion
Nov. 20 The Wilderness Question

Nov. 25 Through Nov. 28 Thanksgiving Break

Section E: Hazards and Society

Dec. 2 Shorelines; playground versus nature
Dec. 4 Volcanoes as an example of hazards
Dec. 9 Earthquakes
Dec. 11 Review session for final exam

Dec. 15-19 Finals Week

The above schedule for this course is subject to change in the event of extenuating circumstances.