SCIENCE, TECHNOLOGY, AND SOCIETY

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Courses given in Science, Technology, and Society have the subject code STS. For a complete list of subject codes, see Appendix.

Technology and science are activities of central importance in contemporary life, intimately bound up with society's evolving character, problems, and potentials. If scientific and technological pursuits are to further enhance human well-being, they and their effects on society and the individual must be better understood by non-technical professionals and ordinary citizens as well as by engineers and scientists. Issues of professional ethics and social responsibility confront technical practitioners. At the same time, lawyers, public officials, civil servants, and business people are increasingly called upon to make decisions requiring a basic understanding of science and technology and their ethical, social, and environmental consequences. Ordinary citizens, moreover, are being asked with increasing frequency to pass judgment on controversial matters of public policy related to science and technology. These circumstances require education befitting the complex sociotechnical character of the contemporary era.

Science, Technology, and Society (STS) is an interdisciplinary program devoted to understanding the natures, consequences, and shaping of technological and scientific activities in modern and contemporary societies. Achieving this understanding requires critical analysis of the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental factors. Hence, students in STS courses study science and technology in society from a variety of perspectives in the humanities and social sciences. To provide a basic understanding of technology and science, STS majors are also required to achieve either literacy (B.A.) or a solid grasp of fundamentals (B.S.) in some area of engineering or science.

GENERAL INFORMATION

Selected STS courses may be used, individually or in groups, for various purposes:

1. To satisfy University General Education Requirements
2. To satisfy the Technology in Society Requirement of the School of Engineering
3. To comprise parts of student-designed concentrations required for majors in fields such as Human Biology and Public Policy
4. To satisfy the requirements of the STS Honors Program complementing any major (see below)
5. To satisfy requirements for majors in STS (see below)
6. To satisfy requirements for a minor in STS (see below)

STS courses are particularly valuable for undergraduates planning further study in graduate professional schools (for example, in business, education, engineering, law, journalism, or medicine) and for students wishing to relate the specialized knowledge of their major fields to broad technology and science-related aspects of modern society and culture.

The STS Program is a unit of the Center for the Interdisciplinary Study of Science and Technology (CISST). For further information about CISST see the "Academic Centers" section of this bulletin.

UNDERGRADUATE PROGRAMS

Degree programs in STS are interdisciplinary curricula devoted to understanding the nature and significance of technology and science in modern society. Majors analyze phenomena of science and technology in society from ethical, aesthetic, historical, economic, and sociological perspectives. In addition, students pursuing the B.A. degree study a technical field in sufficient depth to obtain a grasp of basic concepts and methods, and complete a structured concentration on a theme, issue, problem, or area of personal interest related to science and technology in society. Those seeking the B.S. degree complete at least 50 structured units in technology, science, and mathematics. The particular technical courses chosen reflect the student's special interest in science and technology in society. Specific requirements for the bachelor's degree in STS are as follows:

BACHELOR OF ARTS

1. *STS Core* (eight courses):
   a) Interdisciplinary Foundational course: STS 101 or 101Q
   b) Disciplinary Analyses (five courses with at least one in each category):
      1) philosophical/ethical perspectives: STS 110, 112, 114, 116, 118
      2) historical perspectives: STS 102, 120, 122, 123A, 124, 126, 128, 130, 134
      3) social science perspectives: STS 138, 152, 162, 169, 171, 172
   c) Advanced courses (one course in each category):
      1) disciplinary analysis: STS 207, 210, 211, 212, 215, 217, 218, 219, 221, 229, 231
      2) senior colloquium: STS 200
2. *Technical Literacy* (five courses):
   a) CS 105 or 106A or equivalent; and
   b) A four-course sequence (minimum of 12 units) in one field of engineering or science (sample sequences available in the STS office); *or*
   c) Four of the following Engineering Fundamentals courses: Engineering 10, 14, 15, 20, 25, 30, 40, 50, 60, 62, 70A (see course descriptions in the "School of Engineering" section of this bulletin).
3. *Thematic Concentration* (minimum of 20 units, at least five courses, one each from among those designated on the appropriate concentration course list as foundational and advanced). Thematic concentrations are organized around an STS-related problem or area. The following thematic concentration topics have been pre-certified: the intersections of technology and science with aesthetics, development, history and philosophy, information and society, public policy, social change, and work and organizations.

Course lists for these concentration topics are available in the STS office. A student selecting one of the certified topics may include one or more courses not on the corresponding course list if they are germane to

the concentration and meet the student's special interests. Alternatively, the student may choose to design a thematic concentration topic and course package subject to program approval. Each thematic concentration, certified or self-designed, requires the signature of an appropriate faculty adviser. See the program director for details.

BACHELOR OF SCIENCE

The student pursuing the B.S. degree shall complete the STS Core and a structured package of at least 50 units of technical courses intended to enable students to understand socially significant technical phenomena in some field of engineering or science. Introductory courses in mathematics or physics (for example, MATH 19 or PHYSICS 19) are not normally counted as parts of this technical depth component.

The B.S. candidate follows one of two models in fulfilling the minimum 50-unit technical depth requirement:

1. *Focused Depth:* at least seven courses amounting to at least 25 units in a single field of science or engineering, with the remaining units (except for at most two stand-alone courses) grouped in sequences of at least three courses each in other fields of science or engineering. For example, a Focused Depth package might contain eight mechanical engineering, three physics, three mathematics, and three computer science courses, and one course each in electrical engineering and chemistry. At least four of the seven courses in the focused depth area must be advanced, that is, not normally taken in the first year of study in that field.
2. *Clustered Depth:* two or more clusters of at least five courses and 15 units each in different fields of science or engineering, with at most two stand-alone courses, and remaining courses, if any, in sequences of three or more courses. For example, a Clustered Depth package might contain five-course clusters in computer science, electrical engineering, and physics, three courses in civil engineering, and one course each in biology and chemical engineering. At least two courses in each cluster area must be advanced.

   It is recommended that B.S. majors complete CS 106A or equivalent.

MINORS

Students planning careers in many technical and non-technical fields, including business, education, engineering, science, law, medicine, and public affairs, are faced with important STS issues in their professional practice. Therefore, a minor in STS is likely to prove practically valuable as well as intellectually stimulating.

Requirements—The STS minor requires successful completion of six courses satisfying the following four requirements:

1. Foundational Course: STS 101 or 101Q
2. One disciplinary analysis course from each of the following three categories:
   a) Philosophical/Ethical Perspectives: STS 110, 112, 114, 115, 116, 117, 118, 119
   b) Historical Perspectives: STS 102, 120, 122, 123A, 124, 126, 128, 130, 134
   c) Social Science Perspectives: STS 138, 152, 162, 169, 171, 172
3. Two advanced courses, from one or two of the following categories, building on courses taken under requirements 1 and 2:
   a) Philosophical/Ethical Perspectives: STS 207, 210, 211, 212, 215, 217
   b) Historical Perspectives: STS 130, 134, 221, 229
   c) Social Science Perspectives: STS 207, 218, 219, 231, 279
4. At least one of the courses taken under requirements 1 to 3 should incorporate a weekly, small group discussion.
5. With at most one exception, all courses taken to satisfy STS minor requirement must be taken for a letter grade where available. The exception cannot be STS 101 or 101Q.

Note—Students wishing to use a course not listed above to satisfy one of the requirements for a minor in STS may petition to do so. For details, inquire at the STS office, Building 370, Room 109.

HONORS PROGRAM

STS offers a limited number of students an opportunity to achieve honors through in-depth study of the interaction of science and technology with society. The honors program is open to students majoring in any field (including STS). Students accepted for this program carry out an honors project, the work for which normally begins in Spring Quarter of the junior year and is completed by mid-May of the senior year. Students who want their theses to be considered for the Firestone Prize must submit them to STS by May 20, 2006; all theses must be submitted to STS by June 1, 2006. STS thesis projects usually entail writing an honors essay, although occasionally students have chosen to produce a technical artifact or carry out some other work that itself represents original thinking. When a project results in a work other than an essay, students must also submit an accompanying scholarly exegesis of the work in question.

ADMISSION

Application for admission to the STS honors program is typically made during the last quarter of the student's junior year. By the eighth week of that quarter, interested students must have completed, or be completing that quarter, at least two of the four courses required to satisfy honors requirements 1 to 4 listed below. Each applicant must also have submitted a formal proposal for her or his project to the STS Honors Committee, including the name of the primary thesis adviser. For proposal parameters, see the document *Honors in STS*, available in the STS office. Students whose proposals are approved are encouraged to apply to attend Honors College in early September to get a running start on their theses. STS honors students are also encouraged to sign up for 1-5 units of credit per quarter in STS 195A,B,C for work on the honors project. While not required, doing so leaves the student sufficient time to finish the thesis in three quarters. Writing a senior honors thesis while simultaneously carrying a full academic load each quarter is a very difficult task to complete with distinction. STS majors pursuing honors in STS or another honors program take STS 200 for 2 units instead of 4 and do not write a research paper for this required course. However, failure to complete the thesis requires additional research work in STS 200. (Note: under exceptional circumstances, a student may be admitted to the STS honors program early in the first quarter of his or her senior year.)

REQUIREMENTS

For non-STS Majors

1. Foundational Course: STS 101 or 101Q
2. One Philosophical/Ethical Perspectives course: STS 110, 112, 114 115, 116, 117, 118, 210, 211, 212, 215
3. One Historical Perspectives course: STS 102, 120, 122, 123A, 124, 126, 128, 130, 134, 221, 229
4. One Social Science Perspectives course: STS 138, 152, 162, 169, 171, 172, 207, 218, 219, 231, 279
5. Honors Project: an original critical essay (or investigative project with accompanying explanatory essay) on an STS topic of general importance (up to 12 units may be taken while working on the thesis). Past honors projects are on file in the STS office library.

For STS majors

1. Completion of STS core.
2. Requirement 5 above.

To earn honors, the project must receive a grade of at least 'B' on the completed thesis. The student not majoring in STS must also achieve a grade point average (GPA) of at least 3.3 in the courses taken to satisfy requirements 1 to 4 above. In the case of STS majors, the student must compile a GPA of at least 3.3 in the entire STS core. If all these requirements are met, the designation "Honors Program in Science, Technology, and Society" is affixed to the student's permanent record and appears in the commencement program.

COURSES

WIM indicates that the course satisfies the Writing in the Major requirements.

See http://sts.stanford.edu for updated course scheduling information, course syllabi, faculty and staff information, and information about how to declare a major or a minor in STS.

INTRODUCTORY

STS 101. Science, Technology, and Contemporary Society—(Graduate students register for 201; same as ENGR 130.) Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. GER:DB-SocSci

4-5 units, Aut (McGinn)

STS 101Q. Technology in Contemporary Society—Stanford Introductory Seminar. Preference to sophomores. Introduction to the STS field. The natures of science and technology and their relationship, what is most distinctive about these forces today, and how they have transformed and been affected by contemporary society. Social, cultural, and ethical issues raised by recent scientific and technological developments. Case studies from areas such as information technology and biotechnology, with emphasis on the contemporary U.S. Unexpected influences of science and technology on contemporary society and how social forces shape scientific and technological enterprises and their products. Enrollment limited to 12. GER:DB-SocSci

4 units, Aut (McGinn)

STS 102. Science, Technology, and Art: The Worlds of Leonardo—(Graduate students register for 202; same as HISTORY 31.) The intersections among science, technology, and society, and an interdisciplinary introduction to Renaissance studies. Why does this 15th-century artist, engineer, and inventor continue to fascinate and inspire innovative, interdisciplinary work? The world of the historical Leonardo, looking at his range of interests and accomplishments (including Mona Lisa, human anatomies, flying machines), and the culture of invention that shaped him. Students think with Leonardo, reconstructing some of his projects. The persistence of the Renaissance as a touchstone for innovation in the 21st century, examining the myth of Leonardo. GER:DB-Hum

5 units, Win (Findlen)

STS 110. Ethics and Public Policy—(Same as MS&E 197, PUBLPOL 103B.) Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations. GER:DB-Hum, WIM

5 units, Win (McGinn)

STS 112. Ten Things: Science, Technology, and Design—(Same as CLASSART 113/213.) Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology.

4-5 units, Win (Shanks)

STS 114. Technology, Ecology, and the Imagination of the Future—Seminar. Literary visions of the future from the 60s to the present. How such texts imagine new and existing technologies in interrelation with the evolution of natural ecosystems. The development of wild habitats, alterations of the human body, and visions of the future city. The role of images and stories about globalization. Literary, scientific, and technical texts. GER:DB-Hum

5 units (Heise) not given 2005-06

STS 115. Ethical Issues in Engineering—(Same as ENGR 131.) Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment. GER:DB-Hum

4 units (McGinn) alternate years, given 2006-07

STS 116. Philosophy and the Scientific Revolution—(Enroll in HPS 61, PHIL 61.)

5 units, Aut (Friedman)

STS 118. The Invention of Modern Architecture—(Enroll in ARTHIST 141/341.)

4 units, Aut (Turner)

STS 120. Science and Technology in Ancient Egyptian Society—(Same as CLASSHIS 131.) From 3000 B.C.E. to the Roman period. What was the source of technological change and innovation in Egypt? Why is the ancient Egyptian legacy important for later developments? What was the balance between changes internal and external to Egypt? Topics: ancient texts concerned with science, technology, mathematics, astronomy, medicine; Egyptian material culture and building techniques; the economic role of technology; Alexandrian science and its legacy.

4 units (Manning) not given 2005-06

STS 122. American Spaces: An Introduction to Material Culture and the Built Environment—(Enroll in HISTORY 164, AMSTUD 152.)

5 units, Spr (Corn)

STS 123A. The Scientific Revolution—(Enroll in HISTORY 232F/332F.)

5 units, Win (Findlen)

STS 124. American Economic History—(Enroll in ECON 116.)

5 units, Spr (Wright)

STS 126. The Prehistory of Computers—(Enroll in HISTORY 241J/341J.)

3-5 units (Riskin) not given 2005-06

STS 128. Science and Technology in WW II and What Happened Afterward—(Same as EE 45.) The efforts of engineers, mathematicians, and scientists during WWII. The effect on the postwar world in areas such as information, communication, transportation, materials, and medicine. Science and engineering in the war effort, and what became of them after the war, drawn from: encryption and computation; radar, communication, and electronics; control and optimization; materials; drugs and medicine. GER:DB-EngrAppSci

3 units (Osgood) not given 2005-06

STS 130. Origins and History of the Scientific Fact—(Enroll in HISTORY 241F/341F.)

5 units (Riskin) not given 2005-06

STS 134. History of the Senses—(Same as HISTORY 241G/341G.) Technological, medical, philosophical, and scientific history of the five senses, drawing upon readings from antiquity to the present. How physiologists and philosophers have explained the functioning of the senses; how doctors have tampered with them both to help and to hinder; and how technologies including medical devices, scientific instruments, and tools of the arts have continually transformed the nature and experience of sensation. GER:DB-SocSci

5 units (Riskin) not given 2005-06

STS 138. International Security in a Changing World—(Enroll in POLISCI 114S.)
5 units, Win (Sagan, Blacker, Perry)

STS 145. History of Computer Game Design: Technology, Culture, and Business—Historical contexts include entertainment media, computing technology, applications of gaming technology, and business history. Topics: play in human culture, early computer games from chess to space war, the role of artificial intelligence research, the history of computer graphics and sound technology, the evolution of techniques and genres of computer game design, video game machines, games and the microcomputer revolution, networked gaming, gadgets and games as factors in the evolution of software and hardware, marketing, gendering of games and game play, virtual worlds, simulation, video and computer game industries, and technology transfer such as military simulations. Enrollment limited to 90.
4 units (Lowood) not given 2005-06

STS 152. Digital Media in Society—(Enroll in COMM 120/220.)
4-5 units, Spr (Turner)

STS 162. Computers and Interfaces—(Enroll in COMM 169/269.)
4-5 units, Win (Nass)

STS 163. Risk in Contemporary Culture—How people perceive, assess, and handle risks. Concepts such as risk, uncertainty, probability, and safety. Approaches to risk assessment, management, and communication. Relationship between scientific experts and the public. Relationship of science to state agencies in the context of regulatory decision making for high risk technologies.
4 units, Spr (Schmid)

STS 165. Science and Engineering in the Security State—How defense research changes how scientists and engineers work. How the research projects of the Cold War shaped practices in disciplines including computing, physics, biology, medicine, environmental sciences, and social sciences. Challenges faced by scientists and engineers in the context of heavy defense spending.
4 units, Spr (Slayton)

STS 169. History of Nuclear Weapons—(Enroll in HISTORY 103E, POLISCI 116.)
5 units (Holloway) not given 2005-06

STS 170. Technology in Modern Security Discourse—Technology's central role in discussions of international security issues including nuclear proliferation or containment, ballistic missiles or anti-missiles, biological weapons or vaccines, and data mining or computer security. What uses can and should technology serve in diplomacy? Why are some weapons stigmatized while others are deemed acceptable? How does discourse itself become a weapon? The history of the technologies and the discourses about them.
4 units, Aut (Slayton)

STS 171. Technology and National Security—(Enroll in MS&E 193/293.)
3 units, Aut (Perry, Paté-Cornell)

STS 172. Issues in Technology and Work for a Post-Industrial Economy—(Enroll in MS&E 181.)
3 units, Spr (Barley)

STS 173. High Technology Entrepreneurship—(Enroll in ENGR 145.)
4 units, Win (Byers, Komisar)

STS 184. Technology Policy—(Enroll in PUBLPOL 194.)
5 units, Win (Windham)

STS 190. Honors Seminar—For juniors intending to pursue honors in STS or a related discipline. Goal is to identify a research problem and identify key components of honors research and thesis writing such as literature reviews, methodologies, theoretical frameworks, and writing standards.
4 units, Win (Slayton)

STS 195A,B,C. Honors Project—For students in STS honors program. 195A for submission of proposal; 195B for continued study and writing; 195C for final work on project.
1-5 units, Aut, Win, Spr (Staff)

STS 199. Individual Work
1-5 units, Aut, Win, Spr (Staff)

ADVANCED UNDERGRADUATE AND GRADUATE

STS 200. Senior Colloquium—Key analytical and theoretical texts treating the natures and interplay of science, technology, and society. Only STS majors writing senior honors theses may take for 2 units. Prerequisite: STS major with senior standing and four STS core courses, or consent of instructor.
2-4 units, Win (Roberts), Spr (Heise)

STS 201. Science, Technology, and Contemporary Society—(Same as 101, ENGR 130; see 101.)
4-5 units, Aut (McGinn)

STS 202. Science, Technology, and Art: The Worlds of Leonardo—(Same as 102, HISTORY 31; see 102.)
5 units, Win (Findlen)

STS 207. Science, Technology, and Economic Growth—(Enroll in ECON 224.)
2-5 units, Aut (David)

STS 210. Ethics, Science, and Technology—Ethical issues raised by advances in science and technology. Topics: biotechnology including agriculture and reproduction, the built environment, energy technologies, and information technology. Prerequisite: 110 or another course in ethics. Limited enrollment. GER:DB-Hum
4 units, Spr (McGinn) alternate years, not given 2006-07

STS 211. Foundations of Nanoethics: Toward a Rapprochement between Europe and the U.S.—(Enroll in FRENGEN 258E.)
3-5 units, Spr (Dupuy)

STS 212. Ethics, Technology, and International Relations—(Enroll in INTNLREL 205.)
5 units, Spr (McGinn)

STS 215. Computers, Ethics, and Social Responsibility—(Enroll in CS 201.)
3-4 units, Spr (Johnson)

STS 217. Good Products, Bad Products—(Enroll in ME 314.)
3-4 units, Win (Beach)

STS 218. The Role of the University in the Knowledge Economy—The industrial world has come to consist of knowledge economies; economic performance has come to depend upon the ability to advance knowledge in science and technology. University research activities are sources of commercial advantage. Many universities routinely take out patents, some of which are highly profitable. The historical forces and the social and economic policy implications behind the new economic importance of universities. Emphasis is on Stanford's role in Silicon Valley.
3 units (Rosenberg) not given 2005-06

STS 219. Management and Organization of Research and Development—(Enroll in MS&E 281.)
3 units (Barley) not given 2005-06

STS 221. The Politics and Ethics of Modern Science and Technology—(Same as HISTORY 257.) The WW II decision to build and use the atomic bomb. The controversy over the H-bomb. The Oppenheimer loyalty-security case and the relationship of scientist to the state. Medical experimentation on humans and pitfalls of technology. Relations among science, technology, and university. GER:DB-Hum
5 units (Bernstein) not given 2005-06

STS 229. When Worlds Collide: The Trial of Galileo—(Enroll in HISTORY 232G/332G.)
5 units, Win (Findlen)

STS 231. Technology and Work—(Enroll in MS&E 284.)
3 units (Barley) not given 2005-06

STS 269. Experimental Research in Advanced User Interfaces—(Enroll in COMM 268/368.)
1-5 units, Win, Spr (Nass)

STS 279. Technology, Policy, and Management in Newly-Industrializing Countries—Technology as the key to development and prosperity. Building technological capability in newly industrializing countries at the national and firm levels. Government intervention, the concept of technology leader and follower environments, technology transfer from leader countries, indigenous technological capability, human capital, culture and innovation, the role of small firms and new enterprises. How innovation is different in technology followers, organizing for shop floor innovation, building an innovation culture, the role of R&D, design, and technology strategy in followers. Cases from Korea, India, Brazil, Singapore, and other NICs.
2-4 units (Forbes) alternate years, given 2006-07

STS 299. Advanced Individual Work
1-5 units, Aut, Win, Spr (Staff)

OVERSEAS STUDIES

Courses approved for the Science, Technology, and Society major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

BEIJING

STS 127V. History of Science and Technology in China—(Same as HPS 105V.)
4 units, Spr (Ren)

BERLIN

STS 117V. The Industrial Revolution and its Impact on Art, Architecture, and Theory—(Same as ARTHIST 141Y.)
5 units, Aut (Neckenig)

STS 119V. Architecture and the City, 1871-1990: Berlin as a Nucleus of Modernity—(Same as ARTHIST 110Y, HISTORY 229V, URBANST 143U.)
4 units, Spr (Neckenig)

STS 120V. Industry, Technology, and Culture, 1780-1945—(Same as HISTORY 105V.)
4 units, Win (Neckenig)

FLORENCE

STS 125V. Modernist Italian Cinema—(Same as ITALGEN 134F, ARTHIST 161Y.)
5 units, Aut (Campani)