SCHOOL OF HUMANITIES AND SCIENCES

SCIENCE, TECHNOLOGY, AND SOCIETY

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Courses offered by the Program in Science, Technology, and Society are listed under the subject code STS on the *Stanford Bulletin's* ExploreCourses web site.

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.

STS courses may be used, individually or in groups, for purposes such as:

1. To satisfy University General Education Requirements (GER)
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.

UNDERGRADUATE MISSION STATEMENT

The mission of the Science, Technology and Society (STS) Program is to provide Stanford undergraduates with intellectually stimulating education that will prepare them for life in the contemporary era, one in which science and technology are pervasive and potent forces for transformative social change. To that end, STS courses explore the evolving natures and interrelationship of science and technology, influences of science and technology on different kinds of societies, how societies manage and otherwise shape their scientific and technological endeavors and products, and ethical, social, cultural, and policy issues raised by scientific and technological innovations in contemporary societies. STS faculty believe that probing study of this vital subject matter is the basis for an innovative form of liberal arts and pre-professional education, one that helps STS students fulfill their future civic and professional roles in an informed, responsible manner.

The STS Program is interdisciplinary in nature; its students learn to critically analyze the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental systems. To a set of core STS interdisciplinary courses promoting such learning, Program majors add structured sets of pertinent disciplinary courses in the humanities, social sciences, natural sciences, and engineering. The Program prepares its majors for successful careers in business, law, medicine, education, engineering, public policy, and public service, for masters-level work in selected social scientific and engineering disciplines, and for doctoral work in STS and STS-related academic areas.

UNDERGRADUATE PROGRAMS IN SCIENCE, TECHNOLOGY, AND SOCIETY

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 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/or mathematics. The particular technical courses chosen reflect the student's special interest in science and technology in society.

BACHELOR OF ARTS IN SCIENCE, TECHNOLOGY, AND SOCIETY

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/Aesthetic Perspectives: STS 110, 112, 114; ENGLISH 176
   2. Historical Perspectives: STS 128; CLASSGEN 123, 133; ECON 116; HISTORY 41A/141A, 140A, 208A; POLISCI 116
   3. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ECON 113; MS&E 181, 185, 193; POLISCI 114S, 116; SOC 114

c. Advanced courses (one course in each category):
   1. Disciplinary Analysis: STS 210, 211; CS 181; COMM 268; ECON 224, 225, 226; EDUC 358X; HISTORY 243G; ME 314; SOC 115
   2. STS 200. Senior Colloquium

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: ENGR 10, 14, 15, 20, 25, 30, 31, 40, 50, 50M, 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 concentrations have been pre-certified as declarable fields of study on Axess: The Intersections of Technology and Science with Aesthetics; Development; History and Philosophy; Information and Society; Public Policy; Social Change; and Work and Organizations. These fields of study appear on the transcript but not on the diploma.
   Course lists for these thematic concentrations are available in the STS office. A student choosing 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. A self-designed thematic concentration is not declared on Axess.
   Each thematic concentration, certified or self-designed, requires the signature of an appropriate faculty adviser. See the program director for details.
4. STS majors not writing an honors thesis must produce an original, 20-25 page senior paper on an STS topic of personal interest. Intended as a capstone experience, each student's senior paper is evaluated by an STS faculty committee and placed in the student's permanent STS major file.

HONORS PROGRAM

STS offers 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 research project, typically beginning in the Winter or Spring Quarter of the junior year and finishing by May of the senior year. Students who want their projects to be considered for University awards must complete their theses by early May. STS projects entail writing an original honors thesis, although occasionally students have also 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. Past honors projects are on file in the STS office library.

ADMISSION

Application for admission to the STS honors program is typically made during the last quarter of the student's junior year. By the end of that quarter, interested students must have a plan for completing all courses required to satisfy honors requirements 1-3 listed below. Students requiring a major grant should enroll in STS 190, Junior Honors Seminar, during the Winter Quarter of the junior year in order to submit a research proposal by the University deadline in early April. Each applicant must submit a research proposal to the STS Honors Director, Rebecca Slayton (rslayton@stanford.edu), including the name of at least one potential thesis adviser. For proposal parameters, see the document *STS Honors Program*, available in the STS office and on the STS web site. Students are also encouraged to apply to join the STS contingent of the Bing Honors College in early September to get a running start on their theses. See http://ual.stanford.edu/OO/honors/BingHonors.html for further details.

REQUIREMENTS

1. *Course Work*—Non-STS majors must complete requirements 1 and 2 of the STS minor and either STS 190 and/or the Bing Honors College. STS majors must complete the STS core. Students pursuing STS honors must also sign up for STS 290 A,B,C, Senior Honors Seminar, in each quarter of the senior year for which the students are on campus. STS majors pursuing honors are not required to enroll in STS 200, Senior Colloquium, or to write a separate senior paper. The minimum GPA for courses taken to meet these requirements is 3.4.
2. *The Honors Project*—An original critical essay or investigative project with accompanying explanatory essay on an STS topic of general importance. To earn honors, students must earn at least a 'B' on the completed thesis.
3. *STS Honors Day*—All students present their research projects at a special event in early June of the senior year.

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.

COGNATE COURSES

The following cognate courses offered by other departments may be used to fulfill STS major, minor, and honors requirements:

1. *Disciplinary Analysis: Philosophical/Ethical/Aesthetic Perspectives*—
   ENGLISH 176. Science Fiction
2. *Disciplinary Analysis: Historical Perspectives*—
   CLASSGEN 123. Urban Sustainability
   CLASSGEN 133. Invention of Science
   ECON 116. American Economic History
   HISTORY 41A/141A. Emergence of Medicine
   HISTORY 140A. The Scientific Revolution
   HISTORY 208A. Science and Law in History
   POLISCI 116. History of Nuclear Weapons
3. *Disciplinary Analysis: Social Science Perspectives*—
   ANTHRO 82. Medical Anthropology
   ANTHRO 180. Science, Technology, and Gender
   COMM 120. Digital Media in Society
   COMM 169. Computers and Interfaces
   ECON 113. Economics of Innovation
   ENGR 145. Technology Entrepreneurship
   MS&E 181. Issues in Technology and Work for a Post-Industrial Economy
   MS&E 185. Global Work
   MS&E 193/193W. Technology and National Security
   POLISCI 114S. International Security in a Changing World
   POLISCI 116. History of Nuclear Weapons
   PUBLPOL 194. Technology Policy
   SOC 114. Economic Sociology
4. *Disciplinary Analysis, Level II Courses*—
   CS 181. Computers, Ethics, and Public Policy
   COMM 268. Experimental Research in Advanced User Interfaces
   ECON 224. Science, Technology, and Economic Growth
   ECON 225. Economics of Technology and Innovation

ECON 226. U.S. Economic History
EDUC 358X. Developments in Access to Knowledge and Scholarly Communication
HISTORY 243G.Tobacco and Health in World History
ME 314. Good Products, Bad Products
SOC 115. Topics in Economic Sociology

BACHELOR OF SCIENCE IN SCIENCE, TECHNOLOGY, AND SOCIETY

The student pursuing the B.S. degree must complete the STS Core (see requirement 1 in "Bachelor of Arts in Science, Technology, and Society" above) 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.
3. Each STS major not writing an honors thesis must produce an original, 20-25 page senior paper on an STS topic of personal interest. Intended as a capstone experience, each student's senior paper is evaluated by an STS faculty committee and placed in the student's permanent STS major file.

COGNATE COURSES

For a list of cognate courses offered by other departments that can be used to satisfy requirements for the B.S. in Science, Technology, and Society, see the "Bachelor of Arts in Science, Technology, and Society" section of this bulletin.

MINOR IN SCIENCE, TECHNOLOGY, AND SOCIETY

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 completion of six courses satisfying the following requirements:

1. *Foundational Course:* STS 101 or 101Q
2. One disciplinary analysis course from each of the following categories:
   a. Philosophical/Ethical Perspectives: STS 110, 112, 114, 115; ENGLISH 176
   b. Historical Perspectives: STS 128; CLASSGEN 123, 133; ECON 116; HISTORY 41A/141A, 140A, 208A; POLISCI 116
   c. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ENGR 145; MS&E 181, 185, 193; POLISCI 114S, 116; PUBLPOL 194; SOC 114
3. Two advanced courses, from one or two of the following categories and building on courses taken under requirements 1 and 2:
   a. Philosophical/Ethical/Aesthetic Perspectives: STS 210, 211; CS 181; ME 314
   b. Historical Perspectives: ECON 224, 226; HISTORY 243G
   c. Social Science Perspectives: COMM 268; ECON 224, 226; EDUC 358X; SOC 115
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 requirements must be taken for a letter grade where available. The exception cannot be STS 101 or STS 101Q.
6. The six courses taken under requirements 1-3 should be chosen so as to realize a measure of intellectual coherence and interrelatedness.

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 200, Room 19.

COGNATE COURSES

For a list of cognate courses offered by other departments that can be used to satisfy requirements for the minor in Science, Technology, and Society, see the "Bachelor of Arts in Science, Technology, and Society" section of this bulletin.

OVERSEAS STUDIES COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

FLORENCE

OSPFLOR 134F. Modernist Italian Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

SPRING QUARTER

BERLIN

OSPBER 45. Computers, Ethics, and Public Policy. 3-4 units, Eric Roberts, WIM, GER:EC:EthicReas

SCIENCE, TECHNOLOGY, AND SOCIETY (STS)

UNDERGRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

STS 101. Science, Technology, and Contemporary Society
(Same as ENGR 130, STS 201) 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, R)

STS 101Q. Technology in Contemporary Society
(S,Sem) 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, R)

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, EC-EthicReas, WIM
5 units, Win (McGinn, R)

STS 112. Ten Things: An Archaeology of Design
(Same as CLASSART 113, CLASSART 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. GER:DB-SocSci
3-5 units, Win (Shanks, M)

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, alternate years, not given this year

STS 144. Game Studies: Issues in Design, Technology, and Player Creativity
What can be learned about innovation from digital games? Digital game technologies, communities, and cultures. Topics include game design, open source ideas and modding, technology studies, player/consumer-driven innovation, fan culture, transgressive play, and collaborative co-creation drawn from virtual worlds and online games.
4 units, not given this year

STS 180. Imagining the Computer, Wiring the World
(Same as STS 280) The theme of revolution in th epopular imagination about computing. How people imagine themselves as members of a global network society, navigating cyberspace and pioneering a bold, new information age. But where did modern information technology come from? Has it brought about revolution, and if so for whom? The cultural and political visions that shaped modern computing, and how the resulting technology has shaped a globalizing sociopolitical order.
4 units, Spr (Slayton, R)

STS 190. Junior 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.
3-4 units, Win (Slayton, R)

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

STS 200. Senior Colloquium
Analytical and theoretical texts treating the natures and interplay of science, technology, and society. Prerequisite: STS major with senior standing and four STS core courses, or consent of instructor.
4 units, Win (Roberts, E; Windham, P)

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, R)

STS 290A. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to write a literature review with adviser consultation.
1-5 units, Aut (Slayton, R)

STS 290B. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to analyze data and write up results.
1-5 units, Win (Slayton, R)

STS 290C. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to complete final thesis.
1-5 units, Spr (Slayton, R)

GRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

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

STS 280. Imagining the Computer, Wiring the World
(Same as STS 180) The theme of revolution in th epopular imagination about computing. How people imagine themselves as members of a global network society, navigating cyberspace and pioneering a bold, new information age. But where did modern information technology come from? Has it brought about revolution, and if so for whom? The cultural and political visions that shaped modern computing, and how the resulting technology has shaped a globalizing sociopolitical order.
4 units, Spr (Slayton, R)

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