

# SCIENCE, TECHNOLOGY, AND SOCIETY

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Courses offered by the Program in Science, Technology, and Society have the subject code STS, and are listed in the "Science, Technology, and Society (STS) Courses" section of this bulletin.

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:

To satisfy University General Education Requirements (GER)

1. To satisfy the Technology in Society requirement of the School of Engineering
2. To comprise parts of student-designed concentrations required for majors in fields such as Human Biology and Public Policy

3. To satisfy the requirements of the STS honors program complementing any major (see below)
4. To satisfy requirements for majors in STS (see below)
5. 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 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

*STS Core* (eight courses)—

- a. Interdisciplinary Foundational course: STS 101 or 101Q
  - b. Disciplinary Analyses (five courses with at least one in each category):  
Philosophical/Ethical Perspectives: STS 110, 112, 114; PHIL 61  
Historical Perspectives: STS 120, 128, 134, 141; CLASSGEN 133; ECON 116; HISTORY 140A, 208A, 232H; POLISCI 116  
Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; MS&E 181, 184, 185, 193; POLISCI 114S, 116
  - c. Advanced courses (one course in each category):  
Disciplinary Analysis: STS 210, 211, 221, 234; CS 181; COMM 268; ECON 224, 226; EDUC 358X; HISTORY 232G, 243G, 244C; ME 314; MS&E 281  
STS 200. Senior Colloquium
6. *Technical Literacy* (five courses)—
    - d. CS 105 or 106A or equivalent; and
    - e. A four-course sequence (minimum of 12 units) in one field of engineering or science (sample sequences available in the STS office); *or*
    - f. 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).
  7. *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.

8. 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 (rslyaton@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

*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.

9. *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.

10. *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:

*Disciplinary Analysis: Philosophical/Ethical Perspectives*—  
PHIL 61. Science, Religion, and the Birth of Modern Philosophy  
11. *Disciplinary Analysis: Historical Perspectives*—  
ECON 116. American Economic History  
HISTORY 140A. The Scientific Revolution  
HISTORY 208A. Science and Law in History

POLISCI 116. History of Nuclear Weapons  
12. *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  
ENGR 145. Technology Entrepreneurship  
MS&E 181. Issues in Technology and Work for a Postindustrial Economy  
MS&E 184. Technology and Work  
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  
13. *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 226. U.S. Economic History  
EDUC 358X. Developments in Access to Knowledge and Scholarly Communication  
HISTORY 232G. When Worlds Collide: The Trial of Galileo  
HISTORY 243G. Tobacco and Health in World History  
HISTORY 244C. The History of the Body in Science, Medicine, and Culture  
ME 314. Good Products, Bad Products

## 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 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:

*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.

14. *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.

15. 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:

*Foundational Course:* STS 101 or 101Q

16. One disciplinary analysis course from each of the following categories:

- g. Philosophical/Ethical Perspectives: STS 110, 112, 114, 115; PHIL 61
- h. Historical Perspectives: STS 120, 128, 134, 141, 144; CLASSGEN 133; ECON 116; HISTORY 140A, 208A, 232H; POLISCI 116
- i. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ENGR 145; MS&E 181, 184, 185, 193; POLISCI 114S, 116; PUBLPOL 194

17. Two advanced courses, from one or two of the following categories and building on courses taken under requirements 1 and 2:

- j. Philosophical/Ethical Perspectives: STS 210, 211; CS 181; ME 314
- k. Historical Perspectives: STS 221, 234; ECON 224, 226; HISTORY 232G, 243G, 244C
- l. Social Science Perspectives: COMM 268; ECON 224, 226; EDUC 358X; MS&E 281

18. At least one of the courses taken under requirements 1 to 3 should incorporate a weekly small-group discussion.

19. 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.

20. 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.

# SCIENCE, TECHNOLOGY, AND SOCIETY (STS) COURSES

For information on undergraduate programs in Science, Technology, and Society, including cognate course lists applicable to degree requirements, see the “Science, Technology, and Society” section of this bulletin. 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.

## 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

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: Science, Technology, and 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

*4-5 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, Spr (McGinn, R), alternate years, not given next year*

### STS 134. History of the Senses

(Same as HISTORY 241G, HISTORY 341G, STS 234.) 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

*4-5 units, 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, Spr (Lowood, H)*

**STS 153. Living With Social Technologies**

How can technologies facilitate and engage human capacities and needs for social interaction? Do social technologies pose special challenges for policy making and research and how can we respond? Topics include: the emergence of social technologies in cyberspace; gaming, social networking, virtual agents, and social robotics; comparison of communities online and off; technological innovation and new modes of communicating, learning, playing, and working; the social impacts of shifting boundaries between animacy/inanimacy, human/machine, real/virtual.

*4 units, Win (Sabanovic, S)*

**STS 155. Society in the Age of Robots**

Predictions, discourse, and applications of robotics and its impacts on individual lives, cultural practices, and social institutions. Are robots the next step in human evolution? How will robotic technologies affect society in their new roles as caretakers, companions, entertainers, teachers, and guides? Can robotics contribute to solving contemporary social issues such as an aging society? Attention to materials from robotics, the social sciences and humanities, and film and fiction; comparison between the U.S. and Japan.

*4 units, Spr (Sabanovic, S)*

**STS 160. Controversy and Closure: The Politics of Technical Expertise**

What are the causes and consequences of global warming? Do birth control pills increase the risk of cancer? Was there prewar evidence of WMD in Iraq? How political institutions, culture, and technology shape techno-political advice and common assumptions about who counts as an expert.

*4 units, not given this year*

**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, not given this year*

**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 technologies and discourses about them.

*4 units, not given this year*

**STS 176. Technology and Politics**

The impact of politics, scientific advice, and government actors on new technologies; their effects on political life. How politics have shaped the development, use, and regulation of information, bio-, nano-, space-based weapons, nuclear power, and greenhouse gas technologies. How technologies such as television, the Internet, and large computer databases have affected democratic politics, freedom, privacy, equality, civil society, and political participation. Focus is on U.S. politics; attention to developments elsewhere.

*5 units, offered occasionally*

**STS 180. Imagining the Computer, Wiring the World**

(Same as STS 280.) The theme of revolution in the popular 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 195A. Honors Research**

For students in STS honors program. Goal is submission of proposal.

*1-5 units, Aut (Staff), Win (Staff), Spr (Staff)*

**STS 195B. Honors Research**

For students in STS honors program. Continued study and writing.

*1-5 units, Aut (Staff), Win (Staff), Spr (Staff)*

**STS 195C. Honors Research**

For students in STS honors program. Final work on project.

*1-5 units, Aut (Staff), Win (Staff), Spr (Staff)*

**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 (Heise, U), Spr (Dupuy, J)*

**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), alternate years, not given this year*

**STS 221. The Politics and Ethics of Modern Science and Technology**

(Same as HISTORY 257, HISTORY 347.) 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

*4-5 units, not given this year*

**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; Sabanovic, S)*

**STS 290B. Senior Honors Seminar**

For seniors pursuing STS honors. Goal is to analyze data and write up results.

*1-5 units, Win (Sabanovic, S)*

**STS 290C. Senior Honors Seminar**

For seniors pursuing STS honors. Goal is to complete the final thesis.

*1-5 units, Spr (Slayton, R)*

**GRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY**

Primarily for graduate students; undergraduates may enroll with consent of instructor.

**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 234. History of the Senses**

(Same as HISTORY 241G, HISTORY 341G, STS 134.) 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.

*4-5 units, not given this year*

**STS 280. Imagining the Computer, Wiring the World**

(Same as STS 180.) The theme of revolution in the popular 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**

*1-5 units, Aut (Staff), Win (Staff), Spr (Staff)*

**OVERSEAS STUDIES COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY**

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or <http://bosp.stanford.edu>. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

**FLORENCE SCIENCE, TECHNOLOGY, AND SOCIETY COURSES**

**OSPFLOR 134F. Modernist Italian Cinema**

*5 units, Aut (Campani, E)*