

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

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

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/or 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; PHIL 61
 - 2) historical perspectives: STS 120, 125, 128, 134, 141; CLASS-GEN 133; ECON 116; HISTORY 208A, 232F
 - 3) social science perspectives: CASA 82, 132; COMM 120, 169; MS&E 181, 184, 185, 193; POLISCI 114S, 116
 - c) Advanced courses (one course in each category):
 - 1) disciplinary analysis: STS 210, 211, 221, 225, 234; CS 201; COMM 268; ECON 224, 226; HISTORY 232G, 243G, 244C; ME 314; MS&E 281
 - 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, 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.

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.

MINOR

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 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; PHIL 61
 - b) Historical Perspectives: STS 120, 125, 128, 134, 141, 144; CLASSGEN 133; ECON 116; HISTORY 208A, 232F
 - c) Social Science Perspectives: CASA 82, 132; COMM 120, 169; ENGR 145; MS&E 181, 184, 185, 193; POLISCI 114S, 116; PUBLPOL 194
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 210, 211; CS 201; ME 314
 - b) Historical Perspectives: STS 221, 225, 234; ECON 224, 226; HISTORY 232G, 243G, 244C
 - c) Social Science Perspectives: STS 279; COMM 268; ECON 224, 226; MS&E 281
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 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 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, typically beginning in Spring Quarter of junior year and finishing by the end of senior year. Students who want their theses to be considered for a Firestone Award must submit them to STS by May 21; all theses must be submitted to STS by June 7. STS thesis projects entail writing an 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.

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 completed all courses required to satisfy honors requirements 1-5 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 *STS Honors Program*, 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 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.

REQUIREMENTS

For non-STS majors:

1. Foundational Course: STS 101 or 101Q
2. One Philosophical/Ethical Perspectives course: STS 110, 112, 114, 115, 210, 211; CS 201; PHIL 61
3. One Historical Perspectives course: STS 120, 125/225, 128, 134/234, 141, 221, CLASSGEN 133; ECON 116, 224, 226; HISTORY 208A, 232F, 232G, 243G, 244C
4. One Social Science Perspectives course: STS 218, 279; CASA 82, 132; COMM 120, 169; ECON 224, 226; MS&E 181, 184, 185, 193, 281; POLISCI 114S, 116
5. Honors Seminar: STS 190 (typically taken in the spring quarter of the junior year)
6. Honors Project: an original critical essay (or investigative project with accompanying explanatory essay) on an STS topic of general importance. Past honors projects are on file in the STS office library.

For STS majors:

1. Completion of STS core.
2. Requirements 5 and 6 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 3.4 in the courses taken to satisfy requirements 1-5 above. In the case of STS majors, the student must compile a GPA of at least 3.4 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, 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)

PHILOSOPHICAL/ETHICAL PERSPECTIVES

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 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

COGNATE COURSES—PHILOSOPHICAL/ETHICAL PERSPECTIVES

See respective department listings for course descriptions and General Education Requirements (GER) information. See degree requirements above or the program's student services office for applicability of these courses to a major or minor program.

PHIL 61. Science, Religion, and the Birth of Modern Philosophy—(Same as HPS 61.)

5 units, Win (Friedman, M)

HISTORICAL PERSPECTIVES

STS 134. History of the Senses—(Graduate students register for 234; 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

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)

COGNATE COURSES—HISTORICAL PERSPECTIVES

ECON 116. American Economic History

5 units, Spr (Wright, G)

HISTORY 103E. History of Nuclear Weapons—(Same as POLISCI 116.)

5 units, Spr (Holloway, D)

HISTORY 208A/308A. Science and Law in History

4-5 units, Spr (Riskin, J)

HISTORY 232F/332F. The Scientific Revolution

4-5 units, Win (Riskin, J)

SOCIAL SCIENCE PERSPECTIVES

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, Win (Slayton, R)

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 the technologies and the 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, Aut (Windham, P)

COGNATE COURSES—SOCIAL SCIENCE PERSPECTIVES**CASA 82/282. Medical Anthropology***4-5 units, Win (Kohrman, M)***CASA 132. Science, Technology, and Gender***3-5 units, not given this year***COMM 120/220. Digital Media in Society***4-5 units, not given this year***COMM 169/269. Computers and Interfaces***4-5 units, Win (Nass, C)***ENGR 145. High Technology Entrepreneurship***4 units, Aut (Gould, A; Kosnik, T), Win (Byers, T; Kosnik, T)***MS&E 181. Issues in Technology and Work for a Post-Industrial Economy***3 units, Spr (Nelson, A)***MS&E 193/193W/293. Technology and National Security***3 units, Aut (Perry, W; Hecker, S)***POLISCI 114S. International Security in a Changing World**—(Same as IPS 241.)*5 units, Win (Sagan, S; Blacker, C)***PUBLPOL 194. Technology Policy***5 units, Win (Windham, P)***HONORS AND INDEPENDENT STUDY**

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, Spr (Slayton, R)

STS 195A,B,C. Honors Research—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—Analytical and theoretical texts treating the natures and interplay of science, technology, and society. Only STS majors writing senior honors theses may register for 2 units. Prerequisite: STS major with senior standing and four STS core courses, or consent of instructor.

*2-4 units, Win (Dupuy, J), Spr (Heise, U)***PHILOSOPHICAL/ETHICAL PERSPECTIVES**

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

4-5 units, Aut (McGinn, R)

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 next year

STS 211. Foundations of Nanoethics: Toward a Rapprochement between Europe and the U.S.—(Same as FRENGEN 258E.) Nanoethics as a new discipline that accompanies the rise of nanotechnology research in the U.S. and Europe. Differing approaches to the ethics of science and technology in the case of a fledgling technology.

*3-5 units, alternate years, not given this year***COGNATE COURSES—PHILOSOPHICAL/ETHICAL PERSPECTIVES****CS 201. Computers, Ethics, and Social Responsibility***3-4 units, Win (Johnson, M)***ME 314. Good Products, Bad Products***3-4 units, Win (Beach, D)***HISTORICAL PERSPECTIVES**

STS 221. The Politics and Ethics of Modern Science and Technology—(Same as HISTORY 257/347.) 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-SocSci

4-5 units, not given this year

STS 234. History of the Senses—(Same as 134, HISTORY 241G/341G; see 134.)

*4-5 units, not given this year***COGNATE COURSES—HISTORICAL PERSPECTIVES****ECON 224. Science, Technology, and Economic Growth***2-5 units, Win (David, P)***ECON 226. U.S. Economic History***2-5 units, Spr (Wright, G)***HISTORY 232G/332G. When Worlds Collide: The Trial of Galileo***4-5 units, not given this year***HISTORY 241F/341F. History of the Modern Fact***4-5 units, not given this year***HISTORY 243G/343G. Tobacco and Health in World History***4-5 units, Aut (Proctor, R)***HISTORY 244C/444C. The History of the Body in Science, Medicine, and Culture***4-5 units, not given this year***SOCIAL SCIENCE PERSPECTIVES**

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, Spr (Forbes, N), offered occasionally***COGNATE COURSES—SOCIAL SCIENCE PERSPECTIVES****COMM 268/368. Experimental Research in Advanced User Interfaces***1-5 units, Win, Spr (Nass, C)***MS&E 184. Technology and Work***3 units, Aut (Bailey, D)***MS&E 185. Global Work***4 units, not given this year***MS&E 281. Management and Organization of Research and Development***3 units, Aut (Nelson, A)***INDEPENDENT STUDY****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.

FLORENCE

OSPFLOR 134F. Modernist Italian Cinema

5 units, Aut (Campani, E)

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