

Science, Technology, and Public Policy, Additional Major

Additional Major in Science, Technology, and Public Policy

Overview

The Science, Technology, and Public Policy (STPP) undergraduate program in EPP provides non-engineering students with an extra dimension to their education in the areas where science, technology, society, and policy intersect. The complex problems facing our world cannot be tackled through a single-discipline textbook approach, and students need more than technical coursework to prepare them for careers. The curriculum of the STPP additional major provides students with the broad societal perspective and additional analysis skills that employers are seeking.

The Science, Technology, and Public Policy additional major is appropriate for students pursuing a B.S. degree in any traditional field of study, from computer science to biology, economics to psychology, statistics to technical writing. Students in STPP complete all of the coursework for their traditional major but then augment the depth of that knowledge with coursework in economics, decision-making, communications, and data analysis. Students select elective courses that expand their knowledge of current issues in areas such as energy systems, cybersecurity, information networking, human health, environmental impacts, and business innovation. Finally, students participate in project-based courses that mirror problem-solving in today's business world. They work with peers from across disciplines to collectively structure the solution to a current problem with integrated technical and social issues.

Students who complete an STPP degree do not close out any career options open to graduates in their primary major—rather, they open a wide range of additional opportunities. Government, industry, and non-profit groups are seeking employees with both technical and analytical skills to solve current complex problems. Most of our graduates pursue traditional career paths, but they note that the additional skills they develop in the STPP program set them apart from their peers when applying for a job.

Curriculum

Minimum units required for additional major 106

Students pursuing an additional major in STPP must complete three sets of requirements: courses for the STPP additional major, courses for their traditional disciplinary major, and general education courses. The student should refer to the relevant sections of this catalog for the required courses in the traditional disciplinary major. The STPP additional major is designed to be completed with a traditional disciplinary major in the standard eight-semester time frame. However, additional units or course work may be required. Some courses for the STPP additional major may also satisfy requirements for traditional disciplinary majors or for general education courses.

Introductory Courses

The two introductory courses prepare students for the additional major experience through discussion and assessment of technology-policy interactions. 19-101 Introduction to Engineering and Public Policy may qualify as a general education course in some majors. 19-201 Professional Issues in Engineering, Science, Technology and Public Policy is required in addition to any corresponding seminar course in a student's traditional degree program.

		Units
19-101	Introduction to Engineering and Public Policy	12
19-201	Professional Issues in Engineering, Science, Technology and Public Policy	1

Core Area Courses

The four core area courses provide the foundational skills in the social sciences that are needed for robust analysis of policy problems. For students in SCS and MCS, the economics, decision science, and writing course selections may qualify as general education courses, and the statistics elective may qualify for a math/science requirement. For students

in DC and CFA, some core area requirements may be fulfilled by traditional program requirements or general education courses. Students should consult with their advisors in both programs to assure that courses are meeting requirements and providing appropriate depth of content. Students who receive a pre-requisite waiver for 73-102 may complete a higher-level economics course as a substitute with approval.

1. Economics

One of the following or another approved course:

73-102	Principles of Microeconomics	9
84-110	The Economics of Politics and Technology	9

2. Statistics

One of the following or another approved course:

36-220	Engineering Statistics and Quality Control	9
36-226	Introduction to Statistical Inference	9

3. Decision Science

One of the following or another approved course:

19-301	Decision Making Methods for Engineers and Scientists	9
19-469	Behavior, Decision and Policy	9
19-488	Special Topics: Designing for Human Behavior: Incentives, Information & Policy	9
84-369	Decision Science for International Relations	9
88-223	Decision Analysis	12
88-302	Behavioral Decision Making	9

4. Writing and Communications

One of the following or another approved course:

76-270	Writing for the Professions	9
76-271	Introduction to Professional and Technical Writing	9

Technology-Policy Electives (at least 3 courses; 24 units minimum)

STPP Technology-Policy Electives include courses that belong to three categories. First, STPP Technology-Policy Electives include courses that synthesize technical analysis and social analysis perspectives and apply them to problems with substantial societal and technological components. Specific areas of interest for these courses are (1) energy, resources, and the environment, (2) risk assessment, (3) technology innovation, (4) urban engineering, (5) information and communication technology, and (6) product development and design, among others. Second, STPP Technology-Policy Electives include courses that teach methods or analysis skills necessary for solving complex problems. Examples include mathematical or statistical courses related to optimization or estimation, or economics courses related to economic analysis. Finally, STPP Technology-Policy Electives include courses that provide technical background for policy relevant issues. These courses are fundamental for understanding our current technical systems and how proposed changes can be implemented. Examples include courses on electricity systems, telecommunication systems, engine design, or atmospheric systems. A sample of courses for STPP Technology-Policy Electives is below.

19-211	Ethics and Policy Issues in Computing	9
19-303	Cryptocurrencies, Blockchains and Applications	Var.
19-403	Policies of Wireless Systems	12
19-411	Science and Innovation Leadership for the 21st Century: Firms, Nations, and Tech	9
19-416	Responsible AI and AI Governance: Identifying and Mitigating Risks in the Design	Var.
19-429	Climate Change Science and Solutions	9
19-433	Data Science for Technology, Innovation and Policy	9
19-608	Privacy Policy, Law, and Technology	12
19-668	Electric Vehicles: Technology, Economics, Environment and Policy	12

The majority of 19-xxx EPP departmental courses are considered STPP Technology-Policy Electives. Exceptions will be identified when the courses are offered. Courses that are required or used for core area courses for

the additional major can not be used as electives. Courses from other departments also are acceptable as electives with approval. Students should work with their advisors to define areas of concentration or a selection of breadth courses for the STPP Technology-Policy Electives.

Students are required to take at least three STPP Technology-Policy electives for a minimum of 24 units. Units may be added in any combination, but a maximum of one 3-unit course is permitted. Up to 9 units of 19-550 Undergraduate Research may be used with approval. Students may not use a required course from their traditional disciplinary major for these elective units. However, students may use an elective course from their traditional major requirements to meet the requirements of both their traditional engineering major and an STPP Technology-Policy elective, but the units for the course will not be double-counted toward units required for their degree. Some STPP Technology-Policy elective courses may fulfill general education requirements for traditional major programs.

Capstone Courses

19-351	Applied Methods for Technology-Policy Analysis	9
19-451	EPP Projects I	12
19-452	EPP Projects II	12

The capstone courses synthesize the technical skills and knowledge from a student's traditional major with the social science skills and broad perspective of the STPP additional major.

19-351 Applied Methods for Technology-Policy Analysis is a preparatory course for the EPP Projects sequence. 19-351 may be completed as a co-requisite of 19-451 EPP Projects I.

19-451 EPP Projects I and 19-452 EPP Projects II are technology/policy projects which deal with research and development of recommendations for solving actual and critical problems currently affecting society. The students, faculty, and graduate student managers for the project are drawn from the EPP and STPP programs, Social and Decision Sciences, and the Heinz College, and other CMU departments, and hence bring different areas of expertise to the structuring and solution of the problem. The topics for EPP Projects are drawn from diverse areas such as environmental systems and resources, public transportation, urban engineering problems, energy and fuel utilization, the interaction of law and technology, strategic materials and vulnerability of supply, technical issues in national security, and problems in automation, robotics, and communication technology. These capstone courses may qualify as capstone experience courses or general education courses in some major programs.

Notes on STPP additional major requirements

Students should follow the suggested curriculum timelines for completing the course requirements of their primary major program where necessary and will work with both their primary program advisor and the STPP advisor to assure that requirements for both degrees are met.

Students must complete the minimum number of units as required by their primary major for graduation. In some cases, students completing the STPP additional major may need to complete additional units to meet all requirements for the primary major and STPP additional major.

In addition to any other graduation requirements (e.g., regarding course work, minimum QPA, pass/fail course work, etc.) of the student's primary major, students must earn a minimum QPA of 2.0 in all courses required for the STPP additional major.