

# Dietrich College Interdisciplinary Majors

When addressing complex issues, we often rely on approaches that take advantage of a variety of relevant disciplines. The college houses the special category of "interdepartmental majors" for programs where this interdisciplinary approach is most pronounced and in which the varied disciplinary perspectives are most fully integrated. These majors are presented here separately, rather than as departmentally-based options, to reflect and underscore their sponsorship by more than one academic department and the unique features that follow from this structure.

Interdepartmental majors are administered by the academic department of the major's faculty advisor.

## The Major in Economics and Politics

Politics and economics are deeply interconnected. Political institutions and decision-making impact economic growth, income distribution, and many other aspects of economic life. Both fiscal and monetary policies affect the economy, but these policies are often employed with political considerations in mind and can influence political activity. For example, while the United Nations is often thought of in purely political terms, the Security Council can and does impose sanctions on countries—an example of an economic policy used for political change.

The Economics and Politics major is offered jointly between the Undergraduate Economics Program (<https://www.cmu.edu/tepper/programs/undergraduate-economics/>) (UEP) and the Carnegie Mellon Institute for Security and Technology (<http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/instituteforpoliticsandstrategy/www.cmu.edu/cmist/>) (CMIST). Students are equal members of both academic units and receive advising from both units. The major will appeal to any student interested in the design, evaluation, and political implementation of policy. It will be especially attractive to students considering careers in politics, government agencies, political and business consulting, lobbying, or the law.

The BS in Economics and Politics is an interdisciplinary major. The major will develop the political context and underpinnings of economic policy making. It will explore how political institutions resolve the tradeoffs and disagreements associated with policymaking and how they can facilitate or impede desirable economic outcomes.

CMIST strengths lie in topics such as emerging technology, national security, and grand strategy. Economic policy is one facet of grand strategy, through which governments pursue domestic and international goals. It will enable students to understand economic statecraft from a broad perspective. This major will address key issues such as how multilateral economic institutions such as the IMF and World Bank use economic coercion. Whether coercion is successful or not depends not only on the levers of power but on also on variations in regime structures, alongside complex linkages in the international economy. For example, the viability of the "Euro Zone" depends on whether the political-economic agreements necessary to mitigate institutional weaknesses are politically feasible or destined to failure. In short, international economics affects everything from human rights practices to global compliance with climate change treaties.

Economics and Politics is available as both a primary and an additional major. The requirements are the same for both.

### Curriculum

Students must earn a grade of "C" or better in all courses taken in the Department of Economics (73-xxx).

### Mathematics

Students must complete all of the following courses.

21-120	Differential and Integral Calculus	10
or 21-112	Calculus II	
21-256	Multivariate Analysis	9
or 21-259	Calculus in Three Dimensions	

### Foundations (36 units)

Students must complete all of the following courses.

73-102	Principles of Microeconomics *	9
or 73-104	Principles of Microeconomics Accelerated	
73-103	Principles of Macroeconomics	9
84-104	Decision Processes in American Political Institutions	9

84-275	Comparative Politics	9
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**\*Students who place out of 73-102 based on the economics placement exam will receive a pre-req waiver for 73-102 and are waived from taking 73-102**

### Core (63 units)

Students must complete all of the following courses.

73-230	Intermediate Microeconomics	9
73-240	Intermediate Macroeconomics	9
73-265	Economics and Data Science	9
73-274	Econometrics I	9
84-226	International Relations	9
84-266	Research Design for Political Science	9
84-310	International Political Economy	9

### Communication (9 units)

Students must complete one course from the following list.

73-270	Professional Communication for Economists	9
84-250	Writing for Political Science and Policy	9

### Electives (27 units)

Majors are required to take 27 units (three courses) from the elective lists below. At least one course (9 units) must be taken from Economics (73-xxx) and at least one course (9 units) must be taken from the Carnegie Mellon Institute for Security and Technology (84-xxx). Students may complete electives through coursework in the Carnegie Mellon University Washington Semester Program (CMU/WSP) (<https://www.cmu.edu/ips/cmuwsp/>).

#### Economics Electives

73-328	Health Economics	12
73-332	Political Economy	9
73-338	Financial Crises and Risk	9
73-352	Public Economics	9
73-353	Financial Regulation in the Digital Age	9
73-359	Benefit-Cost Analysis	9
73-365	Firms, Market Structures, and Strategy	9
73-421	Emerging Markets	9
73-427	Sustainability, Energy, and Environmental Economics	9

#### International Relations and Political Science Electives

84-200	Security War Game Simulation	6
84-252	Briefing in the Policy World	6
84-303	International Human Rights	6
84-304	In the News: Analysis of Current National Security Priorities	6
84-306	Latin American Politics	9
84-307	Economic and Political History of Contemporary China	9
84-312	Terrorism in Sub-Saharan Africa	6
84-313	International Organizations and Law Taught in Washington, DC, through CMU/WSP	6
84-315	Political Economy of International Migration	9
84-316	Political Economy of Transatlantic Partnership	9
84-317	Defense Resourcing: From Strategy to Execution	6
84-318	Politics of Developing Nations	9
84-319	Civil-Military Relations	9
84-322	Nonviolent Conflict and Revolution	9
84-323	War and Peace in the Contemporary Middle East	9
84-324	The Future of Democracy	9
84-325	Contemporary American Foreign Policy	9
84-327	Repression and Control in Dictatorships	9
84-328	Military Strategy and Doctrine	9
84-329	Asian Strategies	6
84-330	The Shading of Democracy: The Influence of Race on American Politics Taught in Washington, DC, through CMU/WSP	6

84-331	Money, Media, and the Power of Data in Decisionmaking <small>Taught in Washington, DC, through CMU/WSP</small>	6
84-334	The History and Practice of Economic Statecraft <small>Taught in Washington, DC, through CMU/WSP</small>	6
84-335	US China Relations <small>Taught in Washington, DC, through CMU/WSP</small>	6
84-336	Implementing Public Policy: From Good Idea To Reality <small>Taught in Washington, DC, through CMU/WSP</small>	12
84-337	Biomedical Science Research, Policy, and Governance <small>Taught in Washington, DC, through CMU/WSP</small>	6
84-339	Seminar in Public Policy Research <small>Taught in Washington, DC, through CMU/WSP</small>	12
84-340	Making Change: How Organized Interests Work in Washington <small>Taught in Washington, DC, through CMU/WSP</small>	12
84-348	Advocacy, Policy and Practice <small>Taught in Washington, DC, through CMU/WSP</small>	6
84-352	Representation and Voting Rights	9
84-354	The American Experiment: Unravelling the US Electoral System	6
84-360	CMU/WSP: Internship Seminar <small>Taught in Washington, DC, through CMU/WSP</small>	12
84-362	Diplomacy and Statecraft	9
84-365	The Politics of Fake News and Misinformation	9
84-369	Decision Science for International Relations	9
84-370	Nuclear Security & Arms Control	9
84-372	Space and National Security	9
84-373	Emerging Technologies and International Law	9
84-374	Technology, Weapons, and International Conflict	9
84-380	US Grand Strategy	9
84-383	Cyber Policy as National Policy	6
84-386	The Privatization of Force	9
84-387	Remote Systems and the Cyber Domain in Conflict	9
84-388	Concepts of War and Cyber War	6
84-389	Terrorism and Insurgency	9
84-390	Social Media, Technology, and Conflict	9
84-393	Legislative Decision Making: US Congress	9
84-402	Judicial Politics and Behavior	9
84-405	The Future of Warfare	9
84-421	Advanced Topics in American Politics	9
84-440	Collaborative Research in Political Science	Var.
<b>Additional Electives</b>		
19-411	Science and Innovation Leadership for the 21st Century: Firms, Nations, and Tech	9
19-425	Sustainable Energy for the Developing World	9
70-365	International Trade and International Law	9
70-430	International Management	9
79-280	Coffee and Capitalism	9
79-318	Sustainable Social Change: History and Practice	9
80-135	Introduction to Political Philosophy	9
80-136	Social Structure, Public Policy & Ethics	9
80-321	Causation, Law, and Social Policy	9
80-335	Social and Political Philosophy	9
80-348	Health, Human Rights, and International Development	9
80-447	Global Justice	9
88-323	Policy in a Global Economy	9
88-366	Behavioral Economics of Poverty and Development	9
88-419	International Negotiation	9
88-444	Public Policy and Regulations	9

**CAPSTONE (15-21 units)**

Students must complete all of the following courses.

84-450	Policy Seminar	6
73-497	Senior Project or Senior Honors Thesis	9

**Note: Students in the BS in Economics and Politics who complete a Dietrich or Tepper Honors Thesis in economics may use 73-497 (Senior Project) as an economics elective.**

**DOUBLE-COUNTING RESTRICTION**

A maximum of four courses may double count with another major or minor.

**SAMPLE Four Year Plan**

These sample curricula represent a plan for completing the requirements for the B.S. in Economics and Politics. Economics and Politics students are encouraged to spend a semester studying and interning in Washington, DC, through the CMU/WSP (<http://www.cmu.edu/ips/cmuwsp/>), and/or study abroad. The plan below demonstrates that a semester off-campus fits well into the curriculum. Students may declare the BS in Economics and Politics as early as the second semester of the freshman year and should consult frequently with the Economics and Politics advisors about their course of study. Please note that this is only a sample plan of study and not the only possible plan of study. The Economics and Politics major and Dietrich College General Education curricula provide a high degree of flexibility in sequencing and coursework. Double counting between the major and General Education requirements is unlimited. The plan below shows a very conservative view of double counting.

First-Year		Second-Year	
Fall	Spring	Fall	Spring
21-120 Differential and Integral Calculus	21-256 Multivariate Analysis	73-230 Intermediate Microeconomics	73-240 Intermediate Macroeconomics
36-200 Reasoning with Data	73-103 Principles of Macroeconomics	73-265 Economics and Data Science	73-274 Econometrics I
73-102 Principles of Microeconomics	84-275 Comparative Politics	84-226 International Relations	Communication Course (84-250 or 73-270)
84-104 Decision Processes in American Political Institutions	First-Year Writing	84-266 Research Design for Political Science	General Education
Grand Challenge Seminar	Disciplinary Perspectives: Humanities	84-310 International Political Economy	General Education
99-101 Computing @ Carnegie Mellon			
Third-Year		Fourth-Year	
Fall	Spring	Fall	Spring
General Education	CMU/WSP or Study Abroad	73-497 Senior Project	84-450 Policy Seminar
General Education	Explore	General Education	General Education
General Education	Explore	Economics & Politics Elective	Explore
General Education	Explore	Economics & Politics Elective	Explore
Economics & Politics Elective	Explore	Explore	Explore

**The Major in Economics and Statistics**

Amanda Mitchell, *Statistics & Data Science Academic Program Manager*  
 Stephen Pajewski, *Economics Senior Academic Advisor and Program Manager*

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Economics Location: Tepper 2400  
 econprog@andrew.cmu.edu

*The B.S. in Economics and Statistics is jointly advised by the Department of Statistics and Data Science and the Undergraduate Economics Program.*

The Major in Economics and Statistics provides an interdisciplinary course of study aimed at students with a strong interest in the empirical analysis of economic data. With joint curriculum from the Department of Statistics and Data Science and the Undergraduate Economics Program, the major provides students with a solid foundation in the theories and methods of both fields. Students in this major are trained to advance the understanding of economic issues through the analysis, synthesis and reporting of data using the advanced empirical research methods of statistics and econometrics. Graduates are well positioned for admission to competitive graduate programs, including those in statistics, economics and management, as well as for employment in positions requiring strong

analytic and conceptual skills - especially those in economics, finance, education, and public policy.

All economics courses counting towards an economics degree must be completed with a grade of "C" or higher.

## Curriculum

The requirements for the B.S. in Economics and Statistics are the following:

### 1. MATHEMATICAL FOUNDATIONS (PREREQUISITES) 29-42 UNITS

Mathematics is the language in which statistical models are described and analyzed, so some experience with basic calculus and linear algebra is an important component for anyone pursuing a program of study in Economics and Statistics.

#### Calculus

Complete one of the two following sequences of mathematics courses at Carnegie Mellon, each of which provides sufficient preparation in calculus:

##### Sequence 1

21-111	Calculus I	10
21-112	Calculus II	10

and *one* of the following:

21-256	Multivariate Analysis	9
21-259	Calculus in Three Dimensions	10
21-268	Multidimensional Calculus	11

##### Sequence 2

21-120	Differential and Integral Calculus	10
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and *one* of the following:

21-256	Multivariate Analysis	9
21-259	Calculus in Three Dimensions	10
21-268	Multidimensional Calculus	11

#### NOTES:

- Passing the MSC 21-120 assessment test is an acceptable alternative to completing 21-120.

Note: Taking/having credit for both 21-111 and 21-112 is equivalent to 21-120. The Mathematical Foundations total is then 48-49 units. The Economics and Statistics major would then total 201-211 units.

#### Linear Algebra

*One* of the following three courses:

21-240	Matrix Algebra with Applications	10
21-241	Matrices and Linear Transformations	11
21-242	Matrix Theory	11

Note: 21-241 and 21-242 are intended only for students with a very strong mathematical background.

## II. Foundations 54 units

### 2. Economics Foundations 18 UNITS

Take one of the following courses:

73-102	Principles of Microeconomics *	9
73-104	Principles of Microeconomics Accelerated **	9

Take the following course:

73-103	Principles of Macroeconomics	9
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\*Students who place out of 73-102 based on the economics placement exam will receive a pre-req waiver for 73-102 and are waived from taking 73-102

\*\*This course requires students to complete a 4 or 5 on the AP Microeconomics exam or qualifying score on the IB/Cambridge Exams. 73-104 will substitute for any 73-102 prerequisite requirement in other courses. 73-104 is a more rigorous introduction to microeconomics, is taught at a faster pace than 73-102, and dives a bit deeper into key topics. It is designed for students who have prior knowledge to fundamental economic concepts through AP/IB/Cambridge coursework. Enrollment in 73-104 requires special permission. Students who wish

to take this course should add themselves to the 73-104 waitlist once registration opens. The Tepper School will verify the advancement placement scores and will enroll students in 73-104

### 3. Statistical Foundations 36 UNITS

#### DATA ANALYSIS

Data analysis is the art and science of extracting insight from data. The art lies in knowing which displays or techniques will reveal the most interesting features of a complicated data set. The science lies in understanding the various techniques and the assumptions on which they rely. Both aspects require practice to master.

The Beginning Data Analysis courses give a hands-on introduction to the art and science of data analysis. The courses cover similar topics but differ slightly in the examples they emphasize. 36-200 draws examples from many fields and satisfy the DC College Core Requirement in Statistical Reasoning. This course is therefore recommended for students in the college. (Note: a score of 5 on the Advanced Placement [AP] Exam in Statistics may be used to waive this requirement). 36-220 emphasizes examples in engineering.

The Intermediate Data Analysis courses build on the principles and methods covered in the introductory course, and more fully explore specific types of data analysis methods in more depth.

The Advanced Data Analysis courses draw on students' previous experience with data analysis and understanding of statistical theory to develop advanced, more sophisticated methods. These core courses involve extensive analysis of real data with emphasis on developing the oral and writing skills needed for communicating results.

#### Sequence 1 (For students beginning their freshman or sophomore year)

##### Beginning\*

Choose *one* of the following courses:

36-200	Reasoning with Data *	9
36-220	Engineering Statistics and Quality Control	9

\*A score of 5 on the Advanced Placement (AP) Exam in Statistics may be used to waive this requirement. 36-220 emphasizes examples in engineering and Architecture.

Note: Students who enter the program with 36-235 or 36-236 should discuss options with an advisor. Any 36-300 or 36-400 level course in Data Analysis that does not satisfy any other requirement for the Economics and Statistics Major may be counted as a Statistical Elective.

##### Intermediate\*

Choose *one* of the following courses:

36-202	Methods for Statistics & Data Science **	9
36-290	Introduction to Statistical Research Methodology	9
36-309	Experimental Design for Behavioral & Social Sciences	9

\* Or extra data analysis course in Statistics

\*\* Must take prior to 36-401 Modern Regression, if not, an additional Advanced Statistics Elective is required.

#### Advanced Statistics Elective

Choose *two* of the following courses:

36-303	Sampling, Survey and Society	9
36-311	Statistical Analysis of Networks	9
36-313	Statistics of Inequality and Discrimination	9
36-315	Statistical Graphics and Visualization	9
36-318	Introduction to Causal Inference	9
36-460	Special Topics: Sports Analytics	9
36-461	Special Topics: Statistical Methods in Epidemiology	9
36-462	Special Topics: Methods of Statistical Learning	9
36-463	Special Topics: Multilevel and Hierarchical Models	9
36-464	Special Topics: Psychometrics: A Statistical Modeling Approach	9
36-465	Special Topics: Conceptual Foundations of Statistical Learning	9
36-466	Special Topics: Statistical Methods in Finance	9

36-467	Special Topics: Data over Space & Time	9
36-468	Special Topics: Text Analysis	9
36-469	Special Topics: Statistical Genomics and High Dimensional Inference	9
36-490	Undergraduate Research	9
36-493	Sports Analytics Capstone	9
36-497	Corporate Capstone Project	9

**Sequence 2 (For students beginning later in their college career)****Advanced Statistics Electives**Choose *three* of the following courses:

36-303	Sampling, Survey and Society	9
36-311	Statistical Analysis of Networks	9
36-313	Statistics of Inequality and Discrimination	9
36-315	Statistical Graphics and Visualization	9
36-318	Introduction to Causal Inference	9
36-460	Special Topics: Sports Analytics	9
36-461	Special Topics: Statistical Methods in Epidemiology	9
36-462	Special Topics: Methods of Statistical Learning	9
36-463	Special Topics: Multilevel and Hierarchical Models	9
36-464	Special Topics: Psychometrics: A Statistical Modeling Approach	9
36-465	Special Topics: Conceptual Foundations of Statistical Learning	9
36-466	Special Topics: Statistical Methods in Finance	9
36-467	Special Topics: Data over Space & Time	9
36-468	Special Topics: Text Analysis	9
36-469	Special Topics: Statistical Genomics and High Dimensional Inference	9
36-490	Undergraduate Research	9
36-493	Sports Analytics Capstone	9
36-497	Corporate Capstone Project	9

\*\*All Special Topics are not offered every semester, and new Special Topics are regularly added. See section 5 for details.

**III. Disciplinary Core****136-139 units****1. Economics Core 45 UNITS**

73-230	Intermediate Microeconomics	9
73-240	Intermediate Macroeconomics	9
73-270	Professional Communication for Economists	9
73-265	Economics and Data Science	9
73-274	Econometrics I	9
73-374	Econometrics II	9

**2. Statistics Core 36 UNITS**

Take one of the following courses:

36-235	Probability and Statistical Inference I <sup>##</sup>	9
36-225	Introduction to Probability Theory	9

Take one of the following courses:

36-236	Probability and Statistical Inference II <sup>**</sup>	9
36-226	Introduction to Statistical Inference	9
36-326	Mathematical Statistics (Honors)	9

Take both of the following courses:

36-401	Modern Regression	9
36-402	Advanced Methods for Data Analysis	9

\*In order meet the prerequisite requirements for the major, a grade of C or better is required in 36-235 (or equivalents), 36-236 or 36-326 and 36-401.

<sup>#</sup>It is possible to substitute 36-218, 36-219, 36-225 or 21-325 for 36-235. 36-235 is the standard introduction to probability, 36-219 is tailored for engineers and computer scientists, 36-218 is a more mathematically rigorous class for Computer Science students and more mathematically advanced Statistics students (Statistics students need advisor approval to enroll), and 21-325 is a rigorous Probability Theory course offered by the Department of Mathematics.

<sup>\*\*</sup>It is possible to substitute 36-226 or 36-326 for 36-236. 36-236 is the standard introduction to statistical inference.

Please note that students who complete 36-235 are expected to take 36-236 to fulfill their theory requirements. Students who choose to take 36-225 instead will be required to take 36-226 afterward, they will not be eligible to take 36-236.

**3. Statistical Computing 19-21 UNITS**

Take one of the following two courses:

15-110	Principles of Computing	10
15-112	Fundamentals of Programming and Computer Science	12

Complete the following course:

36-350	Statistical Computing	9
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**4. Advanced Electives 36 units**

Students must take two advanced Economics elective courses (numbered 73-300 through 73-495, excluding 73-374 ) and two (or three - depending on previous coursework, see Section 3) advanced Statistics elective courses (numbered 36-303, 36-311, 36-313, 36-315, 36-318, 36-46x, 36-490, 36-493 or 36-497).

**Total number of units for the major 219-235 Units**

**Total number of units for the degree 360 Units**

**Professional Development**

While not required, students are strongly encouraged to take advantage of professional development opportunities and/or coursework. One option is , a fall-only course that provides information about careers in Economics, job search strategies, and research opportunities. The Department of Statistics and Data Science also offers a series of workshops pertaining to resume preparation, graduate school applications, careers in the field, among other topics. Students should also take advantage of the Career and Professional Development Center.

**Additional Major in Economics and Statistics**

Students who elect Economics and Statistics as an additional major must fulfill all Economics and Statistics degree requirements. Majors in many other programs would naturally complement an Economics and Statistics Major, including Tepper's undergraduate business program, Social and Decision Sciences, Policy and Management, and Psychology.

With respect to double-counting courses, it is departmental policy that students must have at least six courses [three Economics (73-xxx) and three Statistics (36-xxx)] that do *not* count for their primary major. If students do not have at least three ECON and three STA classes, they will need to take additional advanced data analysis or economics electives, depending on where the double-counting issue is.

Students are advised to begin planning their curriculum (with appropriate advisors) as soon as possible. This is particularly true if the other major has a complex set of requirements and prerequisites or when many of the other major's requirements overlap with the requirements for a Major in Economics and Statistics.

**Substitutions and Waivers**

Many departments require Statistics courses as part of their Major or Minor programs. Students seeking transfer credit for those requirements from substitute courses (at Carnegie Mellon or elsewhere) should seek permission from their advisor in the department setting the requirement. The final authority in such decisions rests there. The Department of Statistics and Data Science does not provide approval or permission for substitution or waiver of another department's requirements.

If a waiver or substitution is made in the home department, it is not automatically approved in the Department of Statistics and Data Science. In many of these cases, the student will need to take additional courses to satisfy the Economics and Statistics major requirements. Students should discuss this with a Statistics advisor when deciding whether to add an additional major in Economics and Statistics.

**Sample Program**

The following sample program illustrates one way to satisfy the requirements of the Economics and Statistics Major. Keep in mind that the

program is flexible and can support other possible schedules (see footnotes below the schedule).

First-Year		Second-Year	
Fall	Spring	Fall	Spring
21-120 Differential and Integral Calculus	36-202 Methods for Statistics & Data Science	36-235 Probability and Statistical Inference I	36-236 Probability and Statistical Inference II
36-200 Reasoning with Data	21-256 Multivariate Analysis	73-230 Intermediate Microeconomics	21-240 Matrix Algebra with Applications
73-102 Principles of Microeconomics	73-103 Principles of Macroeconomics		73-240 Intermediate Macroeconomics
15-110 Principles of Computing	-----	73-265 Economics and Data Science	73-274 Econometrics I
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Third-Year		Fourth-Year	
Fall	Spring	Fall	Spring
36-350 Statistical Computing	36-402 Advanced Methods for Data Analysis	36-3xx or 36-4xx Advanced Data Analysis Elective	36-3xx or 36-4xx Advanced Data Analysis Elective
36-401 Modern Regression	73-270 Professional Communication for Economists	Economics Elective	Economics Elective
73-374 Econometrics II	-----	-----	-----
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\*In each semester, ----- represents other courses (not related to the major) which are needed in order to complete the 360 units that the degree requires.

Prospective PhD students are advised to add 21-127 fall of sophomore year, replace 21-240 with 21-241, add 21-260 in spring of junior year and 21-355 in fall of senior year.

## The Major in Ethics, History, and Public Policy

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The B.A./B.S. in Ethics, History, and Public Policy (EHPP) is an interdepartmental major offered jointly by the Departments of History and Philosophy.

Preparing students to be leaders is a vital goal of colleges and universities in every democratic society. The intellectual challenges facing public and private sector leaders have expanded dramatically since the pioneering EHPP program began in 1996, but the need remains as great as ever for broadly educated, ethically sensitive, and technically skilled leaders.

EHPP prepares students to demonstrate sophistication and flexibility in their command of interdisciplinary knowledge; deep historical understanding of how modern-day policy problems have emerged and evolved; and clear, rational criteria for ethical and socially just decision making. The curriculum provides students with a strong humanistic foundation for developing such high-level, historically grounded, and ethically attuned leadership capacities. It also offers ample room for specialization in a wide range of policy areas in which the History and Philosophy departments have special expertise, e.g., medicine and public health, criminal justice, environment, technology, artificial intelligence (AI), gender, civil rights, immigration, and education.

### Curriculum

Students seeking a primary major in Ethics, History, and Public Policy may elect to receive either a Bachelor of Arts or a Bachelor of Science degree (additional requirements apply; see below). Basic requirements include 120 units encompassing 45 units in History, 45 units in Philosophy, 18 units in Law and Social Science, and a 12-unit EHPP Capstone Course. This program may also be taken as an additional (i.e., second) major. All courses toward

the major must be taken for a letter grade and must be passed with a grade of "C" or better. Students can double count any course for the major with another major or minor, with the exception of Social and Political History, for which a student can double count a maximum of two courses.

### I. Foundation Courses in History and Philosophy 18 units

Choose one of the following two courses:

79-189	Democracy and History: Thinking Beyond the Self	9
79-248	U.S. Constitution & the Presidency	9

Choose one of the following two courses:

80-130	Introduction to Ethics	9
80-330	Ethical Theory	9

### II. Ethics and Policy Core 36 units

Choose four of the courses below:

*No more than one course may be taken at the 100 level and at least one course must be taken at the 300 level or above.*

80-135	Introduction to Political Philosophy	9
80-136	Social Structure, Public Policy & Ethics	9
80-208	Critical Thinking	9
80-221	Philosophy of Social Science	9
80-234	Race, Gender, and Justice	9
80-244	Environmental Ethics	9
80-245	Medical Ethics	9
80-249	AI, Society, and Humanity	9
80-305	Game Theory	9
80-306	Decision Theory	9
80-321	Causation, Law, and Social Policy	9
80-324	Philosophy of Economics	9
80-330	Ethical Theory	9
80-335	Social and Political Philosophy	9
80-336	Philosophy of Law	9
80-348	Health, Human Rights, and International Development	9
80-447	Global Justice	9

### III. History and Policy Core 36 units

Choose four of the courses below:

79-175	Moneyball Nation: Data in American Life	9
79-204	American Environmental History	9
79-212	Jim Crow America	9
79-215	Environmental Justice from Conservation to Climate Change	9
79-234	Technology and Society	9
79-242	African American History: Reconstruction to the Present	9
79-248	U.S. Constitution & the Presidency	9
79-250	Voting Rights: An Introduction	9
79-278	How (Not) to Change the World	9
79-300	History of American Public Policy	9
79-320	Women, Politics, and Protest	9
79-321	Documenting Human Rights	9
79-330	Medicine and Society: Health, Healers, and Hospitals	9
79-343	Education, Democracy, and Civil Rights	9
79-360	Crime, Policing, and the Law: Historical and Contemporary Perspectives	9
79-370	Technology in the United States	9
79-380	Hostile Environments: The Politics of Pollution in Global Perspective	9

### IV. Foundation Courses in Law and Social Science 18 units

Choose two of the courses below:

17-200	Ethics and Policy Issues in Computing	9
19-101	Introduction to Engineering and Public Policy	12
70-332	Business, Society and Ethics	9
73-102	Principles of Microeconomics	9

73-103	Principles of Macroeconomics	9
84-104	Decision Processes in American Political Institutions	9
84-110	Foundations of Political Economy	9
84-352	Representation and Voting Rights	9
84-393	Legislative Decision Making: US Congress	9
84-402	Judicial Politics and Behavior	9
88-281	Topics in Law: 1st Amendment	9
88-284	Topics of Law: The Bill of Rights	9

*EHPP students will also be able to complete the Foundations of Law and Social Science category by participating in the Washington Semester Program. Students are encouraged to pursue additional policy-relevant courses in law and social science, along lines consistent with their career ambitions.*

#### V. EHPP Capstone Course 12 units

In Fall semester of senior year, EHPP students will participate in an interdisciplinary capstone course that asks students to integrate their studies in Ethics and History by addressing a policy topic of contemporary national urgency (e.g., climate change, immigration, infrastructure, abortion, hate speech, reparations, law enforcement and policing, charter schools, affirmative action, vaccination, taxation, voting rights, global justice). The Departments of History and Philosophy will alternate teaching the EHPP Capstone Course.

79-449	EHPP Capstone Course [cross-listed]	12
80-449	EHPP Capstone Course [cross-listed]	12

#### VI. Bachelor of Science Option

Students may elect to earn a Bachelor of Science rather than a Bachelor of Arts degree by completing two courses from the list below, or by petitioning the Director of EHPP to accept equivalent courses as substitutions.

21-257	Models and Methods for Optimization	9
36-202	Methods for Statistics & Data Science	9
or 70-208	Regression Analysis	
36-303	Sampling, Survey and Society	9
36-309	Experimental Design for Behavioral & Social Sciences	9
70-257	Optimization for Business	9
80-305	Game Theory	9
80-306	Decision Theory	9
88-221	Markets, Democracy, and Public Policy	9
88-223	Decision Analysis	12
88-251	Empirical Research Methods	9
88-300	Programming and Data Analysis for Social Scientists	9

#### Additional Major

The B.A./B.S. in Ethics, History, and Public Policy may be scheduled as an additional major in consultation with the Director of Ethics, History, and Public Policy.

#### Ethics, History, and Public Policy Sample Curriculum

Third-Year	Fourth-Year		
	Fall	Spring	Spring
Foundations Course in History	Foundations Course in Law and Social Sciences	EHPP Capstone Course	Ethics and Policy Core Course
Foundations Course in Philosophy	Foundations Course in Law and Social Sciences	Ethics and Policy Core Course	History and Policy Core Course
Ethics and Policy Core Course	Ethics and Policy Core Course	History and Policy Core Course	Third Course (open)
History and Policy Core Course	History and Policy Core Course	Fourth Course (open)	Fourth Course (open)
Fifth Course Open	Fifth Course (open)	Fifth Course (open)	Fifth Course (open)

The above sample program is presented as a two-year (junior-senior year) plan for completing EHPP major requirements. Its purpose is to show that this program can be completed in as few as two years; not that it must be.

Students may enter the EHPP major, and begin major course requirements, as early as they wish. Students should consult their advisor when planning their program.

## The Major in Information Systems

Joseph S. Mertz, Jr., *Faculty Program Director*  
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Artificial intelligence. Machine learning. Deep learning. Big data. Social networks. Neural networks. Robotics. Automated voice assistants. Blockchain. Driverless vehicles. Web design. Carnegie Mellon University's Information Systems (IS) program (<http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/informationssystemsf/>) will help you do just that. At CMU, Information Systems is a joint degree program between Heinz College and Dietrich College of Humanities and Social Sciences and is strongly technical, drawing from Carnegie Mellon's leadership in computer science, human-centered design, business management, and software engineering. It is deeply rooted in the humanities and social sciences, allowing students the lifelong benefits of a rich liberal arts education. And it provides pathways for students to find their own Information Systems niche through advanced study and exploration with leading researchers.

In addition to General Education Requirements and basic prerequisites in Mathematics and Computer Science, The IS program curriculum includes a broad grounding in humanities and social sciences to promote critical thinking, and interdisciplinary problem-solving, an Information Systems Core to provide business-facing skills needed to design and build effective real-world systems solutions, an Information Systems Breadth focused on professional communications, quantitative analysis, and how technology functions in society, and a concentration that gives you the flexibility and agency to gain expertise in a supporting area and define your own niche in IS.

The IS major is the perfect place for you if you are passionate about using technology for positive gains across society, both economic and humanistic.

For full program information, go to The Major in Information Systems (<http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/informationssystemsf/>).

## The Major in Linguistics

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Linguistics is the scientific study of human language. The central goal of the Linguistics Major is to provide students with the analytical skills and linguistic concepts needed to understand language scientifically, whether formally, as researchers, or informally, as participants in daily linguistic interactions. The foundation of the Linguistics Major is a set of rigorous core courses, informed by contemporary approaches to the study of linguistic form and meaning.

The **Core courses** cover the principal domains of linguistic analysis: phonetics and phonology, syntax and meaning.

Students then move on to the **Extended Core**, which includes more advanced courses as well as courses on a wider range of topics, such as intonation and language variation. These courses are supplemented by a wide-ranging set of electives including linguistically relevant courses taught in other departments.

Primary majors complete their course of study with a Senior Thesis, a semester-long research project carried out independently with one-on-one guidance from a member of the linguistics faculty.

#### Curriculum

The Linguistics **primary major** requires a total of 12 courses plus a senior thesis. The Linguistics **additional major** requires a total of 13 courses (senior thesis not required). This includes 2 semesters of sequential language study for all majors. At least three courses (not including specific language courses) must be at the 300-level or higher. All courses counted towards the major must be taken for a letter grade and passed with a grade of "C" or above. Students may double count any course for the major simultaneously with another major or minor.

#### Linguistics Core (36 units)

Complete the following requirements.

80-180	Nature of Language	9
80-282	Phonetics and Phonology I	9
80-280	Linguistic Analysis	9
or 80-285	Natural Language Syntax	

80-381	Meaning in Language	9
or 80-383	Language in Use	

### Extended Core (27 units)

Choose three courses (27 units) from Extended Core and/or additional courses from Linguistics Core.

80-283	It Matters How You Say It	9
80-284	Invented Languages	9
80-286	Words and Word Formation: Introduction to Morphology	9
80-287	Language Variation and Change	9
80-288	Intonation: Transcription and Analysis	9
80-382	Phonetics and Phonology II	9
80-384	Linguistics of Turkic Languages	9
80-385	Linguistics of Germanic Languages	9
80-388	Linguistic Typology: Diversity and Universals	9
80-488	Acoustics of Human Speech: Theory, Data, and Analysis	9

### LANGUAGE REQUIREMENT

Students must successfully complete 2 semesters of foreign language study in a single language (e.g. 100 & 200 level).

### Electives

Primary majors choose **three** additional electives (27 or more units). Additional majors choose **four** additional electives (36 or more units). Primary majors: see thesis requirement below.

These Electives can be additional courses from the Core or Extended Core courses listed above, the electives list below, or any other course which is approved by the Academic Program Manager as a linguistics elective. Listed below are the additional electives taught on a regular basis. Additional appropriate courses are offered irregularly or on a one-off basis. The Academic Program Manager will provide students with a list of possible electives each semester, and will assist students in selecting electives which are consistent with their goals and interests.

Philosophy		
80-380	Philosophy of Language	9
80-484	Language and Thought	9
English		
76-318	Communicating in the Global Marketplace	9
76-325	Intertextuality	9
76-385	Introduction to Discourse Analysis	9
76-386	Language & Culture	9
76-388	Coding for Humanists	9
76-389	Rhetorical Grammar	9
Modern Languages		
82-239	Crazy Linguistically Rich Asian Languages	9
82-304	French & Francophone Sociolinguistics	9
82-305	French in its Social Contexts	9
82-334	Structure of Chinese	9
82-585	Topics in Second Language Acquisition	9
82-373	Structure of the Japanese Language	9
82-383	Second Language Acquisition: Theories and Research	9
82-388	Topics in Second Language Acquisition	9
Psychology		
85-354	Infant Language Development	9
85-421	Language and Thought	9
Language Technologies Institute		
11-411	Natural Language Processing	12
11-423	ConLanging: Lrng. Ling. & Lang Tech via Constr	12
	Artif. Lang.	
11-492	Speech Processing	12

11-422	Grammar Formalisms	12
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**Note: all 11-xxx courses have significant Computer Science prerequisites. Interested students should check with the course instructor and with the Linguistics Academic Program Manager before registering.**

Statistics and Data Science

36-468	Special Topics: Text Analysis	9
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### SENIOR THESIS [PRIMARY MAJORS ONLY]

Primary majors must complete a senior thesis (a workload equivalent to a 12-unit course) 80-595 Senior Thesis. Topics must be approved by an advisor, who will work with the student and guide the thesis project. Students are responsible for identifying their topic and securing their thesis advisor. Students should work with the Academic Program Manager of the major to begin the process of identifying their thesis topic and advisor during the fall of their senior year at the latest. Students will be required to submit a written proposal of their thesis project, signed by their thesis faculty advisor, before the end of the semester preceding that in which the thesis research will be conducted..

### Additional Major in Linguistics

The Linguistics additional major requires a total of 13 courses. This includes 2 semesters of language study for all majors. At least three courses (not including specific language courses) must be at the 300-level or higher. Additional majors are not required to write a thesis but must take four electives (36 or more units). All courses counted towards the major must be taken for a letter grade and passed with a grade of "C" or above. Students may double count any course for the major simultaneously with another major or minor. If you are interested in obtaining an additional major in Linguistics, please reach out to the Academic Program Manager, Philosophy Department.

## The Major in Psychology and Biological Sciences

This unified major is intended to reflect the interdisciplinary nature of our current research in the fields of psychology and biology, as well as the national trend in some professions to seek individuals broadly trained in both the social and natural sciences. Students entering from the Dietrich College of Humanities and Social Sciences will earn a Bachelor of Science in Psychology and Biological Sciences. Students entering from the Mellon College of Sciences receive a Bachelor of Science in Biological Sciences and Psychology.

### Pre-Major Requirements

The unified major specifies particular pre-major requirements in the areas of mathematical sciences and statistics, natural science, and computational reasoning. Particular courses are specified in these areas because they are prerequisites for courses required in the major and therefore they are the most efficient way to complete the general education requirements for either Dietrich College or SHS. All other general education categories can be filled in any way that satisfies the requirements of the student's college or of the SHS program.

The major in Psychology and Biological Sciences is offered only as a B.S. degree. Full curriculum requirements can be viewed under the Department of Psychology (<http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/departamentofpsychology/#psytotext>) section of the Catalog.

## Student-Defined Major Program

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For Dietrich College students whose educational goals cannot be adequately served by the curricula of existing majors, the college offers the opportunity to self-define a major. The procedure for establishing such a major centers on a written proposal, submitted to the Dietrich College Dean's Office. This proposal consists of two parts:

### Major Description and Rationale

A description of the components of the proposed program of study; a presentation of the objectives of the program of study, how it represents

a coherent and (given available faculty, courses, and other resources) viable course of study, and the reason(s) why these objectives cannot be accomplished within one or more of the college's existing majors.

### **Curriculum**

Presentation of a complete outline of all courses that will comprise the requirements for the major. These courses should be categorized in two ways: first, according to that component of the major program to which each belongs (e.g., mathematical prerequisites; research methods; theoretical perspectives; etc.); and second, a semester-by-semester outline that indicates when each course is to be taken (or, for any already taken, when taken and grade received). In addition to courses taken at Carnegie Mellon, the major's curriculum may include courses taken (or to be taken) at other schools, related projects or internships, or programs of study abroad. The minimum requirements for graduation is, as with all majors in the college, 360 units of credit and completion of the Dietrich College general education program.

Proposals and curricula are evaluated for clarity of focus, coherence and depth in related areas, and viability. Proposals should generally be developed no later than the sophomore year, and approved majors begin their program generally no later than the junior year.

The student-defined option is also possible to propose as an additional major or minor. These options extend to undergraduates from all Carnegie Mellon colleges.