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 Mathematical Sciences

Kathleen Conway, Academic Advisor
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kconway@andrew.cmu.edu

The B.S. in Economics and Mathematical Sciences (http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/undergraduateeconomicsprogram/econmathtext) is a collaborative effort between the Department of Mathematical Sciences and the Undergraduate Economics Program. Combining advanced mathematics with advanced economic theory is the hallmark of this curriculum. The curriculum provides students with courses that complement and develop depth of understanding of economic theory, applied economics, and applied mathematics. This major offers an integrated curriculum, guiding students through a program of coursework that exploits and builds upon the synergies between mathematics and economics. This degree program equips students with the mathematical tools that are essential for success in Ph.D. programs in economics, mathematics; and key functional areas of business including finance, accounting, marketing, and information systems. Students pursuing this degree will be well prepared for the beginning of their research careers in academia, government, and industry. There are a limited number of student slots in this program; interested students may apply as early as their sophomore year.

The Major in Economics and Politics

Kathleen Conway, Senior Academic Advisor, Economics
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Emily Half, Deputy Director, Institute for Politics and Strategy Advising Location: Baker Hall ASSB
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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. Conversely, economic outcomes shape political preferences and policy choices. The overlap between these two disciplines is endless. For example, while the United Nations is often thought of in purely political terms, the Security Council can and does impose sanctions on countries—e.g., an example of an economic policy used for political change.

The Economics and Politics major (http://coursecatalog.web.cmu.edu/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/undergraduateeconomicsprogram/#bsineconomicsandpoliticstext) is offered jointly between the Undergraduate Economics Program (https://www.cmu.edu/tepper/programs/undergraduate-economics/) (UEP) and the Institute for Politics and Strategy (https://www.cmu.edu/ips/) (IPS). 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 B.S. 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.

IPS strengths lie in topics like national security, grand strategy, and globalization. Economic policy is just one facet of grand strategy, through which an administration pursues domestic and international goals. This major will also address key issues such as the complementarity between the multilateral economic institutions such as the IMF and World Bank and the use of economic coercion, and enable students to understand economic statecraft more broadly. Whether coercion is successful depends not just on the lever of power but on also on variations in authoritarian regime structure, and complex linkages in the international economy. This is also important for our understanding of the relationship between international economics on human rights practices, extending even to how treaty commitments can facilitate compliance with a global initiative to combat climate change. And, not least important, there is broad recognition that 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.

Economics and Politics is available as both a primary and additional major.

The Major in Economics and Statistics

Amanda Mitchell, Statistics & Data Science Academic Program Manager
Kathleen Conway, Economics Senior Academic Advisor
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Economics Location: Tepper 2400
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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.

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

I. Prerequisites 38-39 units

1. Mathematical Foundations 38-39 units

Calculus
21-120 Differential and Integral Calculus 10
and one of the following:
21-256 Multivariate Analysis 9
21-259 Calculus in Three Dimensions 9
21-268 Multidimensional Calculus 10

Note: 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 10
21-242 Matrix Theory 10

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

Choose three of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-303</td>
<td>Sampling, Survey and Society</td>
<td>9</td>
</tr>
<tr>
<td>36-311</td>
<td>Statistical Analysis of Networks</td>
<td>9</td>
</tr>
<tr>
<td>36-313</td>
<td>Statistics of Inequality and Discrimination</td>
<td>9</td>
</tr>
<tr>
<td>36-315</td>
<td>Statistical Graphics and Visualization</td>
<td>9</td>
</tr>
<tr>
<td>36-318</td>
<td>Introduction to Causal Inference</td>
<td>9</td>
</tr>
<tr>
<td>36-461</td>
<td>Special Topics: Statistical Methods in Epidemiology</td>
<td>9</td>
</tr>
<tr>
<td>36-462</td>
<td>Special Topics: Methods of Statistical Learning</td>
<td>9</td>
</tr>
<tr>
<td>36-463</td>
<td>Special Topics: Multilevel and Hierarchical Models</td>
<td>9</td>
</tr>
<tr>
<td>36-464</td>
<td>Special Topics: Applied Multivariate Methods</td>
<td>9</td>
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<tr>
<td>36-465</td>
<td>Special Topics: Conceptual Foundations of Statistical Learning</td>
<td>9</td>
</tr>
<tr>
<td>36-466</td>
<td>Special Topics: Statistical Methods in Finance</td>
<td>9</td>
</tr>
<tr>
<td>36-467</td>
<td>Special Topics: Data over Space &amp; Time</td>
<td>9</td>
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<tr>
<td>36-468</td>
<td>Special Topics: Text Analysis</td>
<td>9</td>
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<tr>
<td>36-469</td>
<td>Special Topics: Statistical Genomics and High Dimensional Inference</td>
<td>9</td>
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<tr>
<td>36-490</td>
<td>Undergraduate Research</td>
<td>9</td>
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<tr>
<td>36-493</td>
<td>Sports Analytics Capstone</td>
<td>9</td>
</tr>
<tr>
<td>36-497</td>
<td>Corporate Capstone Project</td>
<td>9</td>
</tr>
</tbody>
</table>

**Professional Development**

While not required, students are strongly encouraged to take advantage of professional development opportunities and/or coursework. One option is 73-210 Economics Colloquium I, 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.

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).

<table>
<thead>
<tr>
<th>First-Year</th>
<th>Second-Year</th>
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<tbody>
<tr>
<td>Fall</td>
<td>Spring</td>
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<tr>
<td>36-200 Reasoning with Data</td>
<td>21-256 Multivariate Analysis</td>
</tr>
<tr>
<td>73-102 Principles of Microeconomics</td>
<td>73-220 Economics Colloquium I</td>
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<thead>
<tr>
<th>Third-Year</th>
<th>Fourth-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>36-401 Modern Regression</td>
<td>73-270 Professional Communication for Economists</td>
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<tr>
<td>73-374 Econometrics II</td>
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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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Patrick Doyle, Academic Program Manager, Philosophy Department
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https://go.oncehub.com/PatDoyle (https://go.oncehub.com/PatDoyle)

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. It prepares students for leadership positions by providing them with a rigorous, interdisciplinary humanistic and social-scientific education. It also serves as an excellent springboard for graduate study in a wide variety of disciplines such as law, public policy, ethics, and advocacy. The program focuses equally on the historical understanding of how modern-day problems have evolved, and the importance of developing clear criteria for ethical decision-making. The capstone project course provides students with the opportunity to engage with real-world public policy challenges using the methods, theories, and knowledge that they have gained through the major. Offered jointly by the departments of History and Philosophy, the B.A./B.S. in EHPP encourages specialization, internship experiences, and research in a wide range of policy areas.

Curriculum

Students graduating with 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 9 units in Economics, 36 units in History, 36 units in Philosophy, 27 units of elective courses, and a 12-unit senior capstone course. This program may also be taken as an additional (e.g., 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. Foundations of Public Policy

Choose one 9-unit course from the list below.

73-102 Principles of Microeconomics 9
84-104 Decision Processes in American Political Institutions 9
84-110 Foundations of Political Economy 9

II. History Core

Choose one 9-unit course from each category below:

Policy History (9 units)

| 79-300 History of American Public Policy | 9 |

U.S. History (9 units)

| 79-204 American Environmental History | 9 |
| 79-212 Jim Crow America | 9 |
| 79-231 American Civil Rights Movement: From Garveyism to Black Power | 9 |
| 79-240 Development of American Culture | 9 |
| 79-242 African American History: Reconstruction to the Present | 9 |
| 79-244 Women in American History | 9 |
| 79-245 Capitalism and Individualism in American Culture | 9 |
| 79-248 U.S. Constitution & the Presidency | 9 |
| 79-249 20th Century U.S. History | 9 |
| 79-320 Women, Politics, and Protest | 9 |

Non-U.S. History (9 units)

| 79-202 Flesh and Spirit: Early Modern Europe, 1400-1750 | 9 |
V. Elective Courses

Choose any three courses (at least 27 units) from any category or categories shown below. Substitution of elective courses that cohere with a student's interest or concentration may be allowed after consultation with and approval from the Academic Program Manager.

Engineering and Public Policy (some courses have prerequisites; see EPP catalog listing)
19-424 Energy and the Environment 9

Business Administration
70-311 Organizational Behavior 9
70-321 Negotiation and Conflict Resolution 9
70-332 Business, Society and Ethics 9
70-364 Business Law 9
70-365 International Trade and International Law 9
70-430 International Management 9

Economics (some courses have prerequisites; see Economics catalog listing)
73-352 Public Economics 9
73-359 Benefit-Cost Analysis 9
73-365 Firms, Market Structures, and Strategy 9
73-408 Law and Economics 9
73-476 American Economic History 9

English
76-492 Rhetoric of Public Policy 9

History
Courses from the EHPP History Core (above) may be taken as electives only if they are not being used to fulfill the core requirement. Double counting is not permitted.
79-145 Genocide and Weapons of Mass Destruction 9
79-189 History of Democracy: Thinking Beyond the Self 9
79-206 Crime and Punishment in Early Modern Europe 9
79-233 The United States and the Middle East since 1945 9
79-234 Technology and Society 9
79-240 Development of American Culture 9
79-242 African American History: Reconstruction to the Present 9
79-247 African Americans, Imprisonment, and the Carceral State 9
79-249 20th Century U.S. History 9
79-250 Voting Rights: An Unexpected History 9
79-261 The Last Emperors: Chinese History and Society, 1600-1900 9
79-265 Russian History: Game of Thrones 9
79-266 Russian History and Revolutionary Socialism 9
79-268 World War I: The Twentieth Century's First Catastrophe 9
79-307 Religion and Politics in the Middle East 9

History Elective (9 units)
Take at least 9 additional units in the History Department with course number 79-200 or above. The following courses may not count: 79-400, 79-420, 79-449, 79-491, 79-505, 79-506

III. Philosophy Core 36 units
Choose one 9-unit course from each category below. No more than 9 units at the 100 level may be counted toward the Philosophy Core.

Ethics (9 units)
80-130 Introduction to Ethics 9
80-330 Ethical Theory 9

Political Philosophy (9 units)
80-135 Introduction to Political Philosophy 9
80-335 Social and Political Philosophy 9

Foundations of Social Science (9 units)
80-221 Philosophy of Social Science 9
80-324 Philosophy of Economics 9

Applied Philosophy (9 units)
80-136 Social Structure, Public Policy & Ethics 9
80-244 Environmental Ethics 9
80-245 Medical Ethics 9
80-249 AI, Society, and Humanity 9
80-336 Philosophy of Law 9
80-348 Health, Human Rights, and International Development 9
80-447 Global Justice 9

IV. Senior Capstone Project Course 12 units
79-449 EHPP Project Course [cross-listed] 12
80-449 EHPP Project Course [cross-listed] 12

The Ethics, History and Public Policy Project Course is required for the Ethics, History and Public Policy major and is taken in the fall semester of the senior year. In this capstone course, Ethics, History and Public Policy majors carry out a collaborative research project that examines a compelling current policy issue that can be illuminated with historical research and philosophical and policy analysis. The students develop an original research report based on both archival and contemporary policy analysis and they present their results to a client organization in the community.

V. Elective Courses 27 units

Choose any three courses (at least 27 units) from any category or categories shown below. Substitution of elective courses that cohere with...
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.
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
76-389 Rhetorical Grammar 9

Modern Languages
82-283 Language Diversity & Cultural Identity 9
82-304 French & Francophone Sociolinguistics 9
82-305 French in its Social Contexts 9
82-373 Structure of the Japanese Language 9
82-383 Second Language Acquisition: Theories and Research 9
82-585 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
11-492 Speech Processing 12
11-422 Grammar Formalisms 9

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.

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/departmentofpsychology/psychbiotext) section of the Catalog.

Student-Defined Major Program

Joseph E. Devine, Director and Associate Dean for Undergraduate Studies
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jd0x@andrew.cmu.edu

For Dietrich College students whose educational goals cannot be as 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.