

Undergraduate Options

This page describes some of the many options of study students can choose during their undergraduate career at Carnegie Mellon.

Additional Majors/Dual Degrees

Students interested in pursuing more than one area of study are encouraged to consider an additional major or dual degree. Students who complete an additional major will earn a single degree in two areas. Generally, it is possible to fulfill the requirements of both majors in four years by taking the course requirements of the second major in the elective spaces allowed by the first major. Students in Carnegie Institute of Technology may elect to double major in Engineering and Public Policy or Biomedical and Health Engineering, which are offered only as an additional major. Human Computer Interaction is also offered only as an additional major.

Dual Degree programs allow students to earn two degrees. Students who are interested in an additional major or dual degree are encouraged to review the specific possibilities with the relevant academic advisor.

Five-Year Bachelor's/Master's Programs

Qualified undergraduates may apply to one of several programs to earn their bachelor's and master's degrees in five years. For further details about these programs, please refer to the appropriate college or departmental section(s).

Carnegie Institute of Technology

The five-year Integrated Master's/Bachelor's programs offered by the Departments of Electrical and Computer Engineering and Civil and Environmental Engineering offers students superior technical preparation for careers in industry. The Departments of Chemical Engineering and Mechanical Engineering also offer fifth year/Accelerated Masters programs. The Department of Materials Science and Engineering offers a cooperative Industrial Internship Option in which students alternate coursework with practical experience in industry. Admission is highly competitive and leads to a Master of Science degree.

Dietrich College of Humanities and Social Sciences

The Department of Philosophy offers a bachelor's/master's degree option: the Bachelor's/Master's degree in Logic and Computation. The M.A. in Teaching English to Speakers of Other Languages (TOESL) is a fifth year master's option for Modern Language students who are concentrating in English as a Second Language. Also, the department of English offers an accelerated program for undergraduates to obtain a Master of Arts in Professional Writing.

H. John Heinz III College

The Heinz College's Accelerated Masters program allows qualified undergraduate students to earn a prestigious Master of Science degree in Public Policy and Management. For students in the College of Fine Arts or the Bachelor of Humanities and Arts degree program who are interested in careers in arts management, the program leads to a Master of Arts Management degree.

Mellon College of Science

The Honors Programs in the Departments of Chemistry and Mathematics are demanding, accelerated programs that give highly qualified students the opportunity to earn their bachelor's and master's degrees in just four years. Admission is by invitation only.

Tepper School of Business 3-2 Program

Students who are interested in business management may wish to consider the Tepper School of Business 3-2 program. Qualified undergraduate students may earn their Master of Business Administration in addition to their bachelor's degree.

Health Professions Program

Director: Jason D'Antonio, PhD
Office: Doherty Hall 1324

The Health Professions Program (<http://www.cmu.edu/hpp>) (HPP) at Carnegie Mellon University is an advising and resource center for all university students and alumni who are interested in one or more aspects of the health professions. This program complements a student's curricular advising and is meant to help students explore their interests, prepare for graduate programs in the health professions, and facilitate their application process. Students can enroll in the program at any time during their academic career, but the importance of early planning is communicated to interested first-year students. Once enrolled, students meet regularly with the director to discuss course requirements, medical exposure opportunities, and other aspects of preparing to be a competitive candidate.

Students in the HPP span all colleges of the university and have many diverse career interests including medicine, dentistry, optometry, biomedical research, medical physics, rehabilitation engineering, medical informatics, and health policy. Although the majority pursue a primary major in the Mellon College of Science, other highly represented disciplines include engineering and the social sciences.

For students interested in medicine or dental medicine, regardless of a student's major, the basic course requirements outlined below must be completed prior to matriculation most of the core courses listed below should be taken before the student takes the Medical College Admissions Test (MCAT) or Dental Admission Test (DAT) that is normally taken in spring of the junior year:

1. One year of Biology with one lab, plus Biochemistry.

This is typically fulfilled by the following Carnegie Mellon courses:

03-121	Modern Biology	9-10
or 03-151	Honors Modern Biology	
42-202	Physiology	9
or 03-220	Genetics	
or 03-320	Cell Biology	
03-124	Modern Biology Laboratory	9-12
or 03-343	Experimental Techniques in Molecular Biology	
or 03-206	Biomedical Engineering Laboratory	
03-232	Biochemistry I	9

2. One year of Inorganic Chemistry with one lab.

This is typically fulfilled by the following Carnegie Mellon courses:

09-105	Introduction to Modern Chemistry I	10
or 09-107	Honors Chemistry: Fundamentals, Concepts and Applications	
09-106	Modern Chemistry II	10
09-207	Techniques in Quantitative Analysis (non-Chem majors)	9
or 09-221	Laboratory I: Introduction to Chemical Analysis	

3. One year of Organic Chemistry with one lab.

This is typically fulfilled by the following Carnegie Mellon courses:

09-217	Organic Chemistry I	9-10
or 09-219	Modern Organic Chemistry	
09-218	Organic Chemistry II	9-10
or 09-220	Modern Organic Chemistry II	
09-208	Techniques for Organic Synthesis and Analysis (non-Chem majors)	9
or 09-222	Laboratory II: Organic Synthesis and Analysis	

4. One year of Physics with one lab.

This is typically fulfilled by the following Carnegie Mellon courses:

33-121	Physics I for Science Students	12
or 33-141	Physics I for Engineering Students	

33-122	Physics II for Biological Sciences and Chemistry Students	9
or 33-142	Physics II for Engineering and Physics Students	
33-100	Basic Experimental Physics	6-9
or 33-104	Experimental Physics	

5. One year of Math.

21-120	Differential and Integral Calculus	10
21-122	Integration and Approximation	10
or 21-124	Calculus II for Biologists and Chemists	
or 36-201	Statistical Reasoning and Practice	

6. One year of English.

This is typically fulfilled by the following Carnegie Mellon courses:

76-101	Interpretation and Argument	9
76-xxx	English course of the student's choice, typically 200-level or higher	

In addition to these general course requirements, recommended coursework includes statistics, behavioral sciences, ethics, and languages. Interdisciplinary studies are also strongly encouraged, and many students design an undergraduate curriculum that incorporates majors and/or minors in both the natural and social sciences. One interesting interdisciplinary minor offered is the Minor in Health Care Policy and Management, which broadens awareness of the health care field from social, economic, historical, and policy perspectives. See <http://coursecatalog.web.cmu.edu/melloncollegeofscience/melloncollegeofscienceminors/> for the details of this minor.

Undergraduate research is a hallmark of the educational experience at Carnegie Mellon in many disciplines. Whether in the psychology lab studying the impact of breast cancer diagnosis on family social dynamics, in the NMR lab imaging metabolic function in the heart or brain, or in the surgery suite testing robotic devices, our students have made significant achievements in research, well beyond the more traditional guided experiments.

Our university policy is to train students to be first class scientists, engineers, artists, writers, managers, or whatever their passion may be. We do not train students to be “pre-med,” but if they choose to use their talents in a health profession, we offer many services to help them obtain their life goals. Regular advising, application workshops, health issue seminars and symposium, community outreach activities, and preceptorship/ internship experiences are all part of our programming. The student pre-health organizations on campus: the Doctors of Carnegie (DOCs); the Minority Association of Premedical Students (MAPS); Alpha Epsilon Delta; Global Medical Brigades; and Global Public Health Brigades, together with the HPP, provide students with many opportunities to learn, explore, and prepare for their chosen area of professional interest.

The HPP has been successful in helping students to define, prepare for, and obtain their professional goals. Our students are regularly accepted at top-level medical, dental and graduate programs, and our alumni continue to serve as outstanding ambassadors of Carnegie Mellon and the training and experience they received here.

Minors

In addition to a student's primary degree, he or she can choose a minor, a secondary focus to the student's area of study, which can enhance a student's breadth of study and overall experience while not requiring the same amount of coursework as a second major or degree. The following list shows available minors. Unless otherwise indicated, minors are generally open to all university undergraduate students.

Intercollege:

- Health Care Policy and Management (sponsored by the College of Humanities and Social Sciences, the H. John Heinz III College, and Mellon College of Science)
- Music Technology
- Neural Computation

College of Engineering:

The following Engineering minors are open to all Carnegie Mellon students::

- Biomedical Engineering
- Engineering Studies

- Technology and Policy
- Robotics

Designated Minors (open only to Engineering students):

- Audio Engineering
- Automation and Controls
- Colloids, Polymers and Surfaces
- Data Storage Systems and Technology
- Electronic Materials
- Environmental Engineering and Sustainability
- Global Engineering
- Materials Science and Engineering
- Mechanical Behavior of Materials

College of Fine Arts:

- Accompanying (available only to Piano majors in the School of Music)
- Architectural Representation and Visualization (available also to B. Arch candidates)
- Architectural Technology
- Architecture
- Architecture History (available also to B. Arch candidates)
- Art
- Building Science (available only to B. Arch candidates)
- Communication Design
- Conducting (available only to students in the School of Music)
- Drama
- History of the Arts
- Industrial Design
- Music
- Music (Composition) (available only to students in the School of Music)
- Music Education (available only to students in the School of Music)
- Music Performance (available only to students in the School of Music)
- Musicology
- Music Technology
- Music Theory
- Photography
- Sound Design

Dietrich College of Humanities and Social Sciences:

- African and African American Studies
- Anthropology
- Arabic Studies
- Chinese Studies
- Cognitive Neuroscience
- Creative Writing
- Economics
- English
- Environmental Studies
- Ethics
- Film and Media Studies
- French and Francophone Studies
- Gender Studies
- German Studies
- Global Systems and Management
- Health Care Policy and Management
- Hispanic Studies
- International Relations and Politics
- Japanese Studies
- Linguistics
- Logic and Computation
- Philosophy
- Policy and Management
- Politics and Public Policy
- Professional Writing
- Psychology
- Religious Studies
- Russian Studies
- Science, Technology and Society
- Social & Political History

- Sociology
- Statistics
- Technical Writing

Mellon College of Science:

- Biological Sciences
- Chemistry
- Computational Finance
- Discrete Mathematics and Logic
- Environmental Science
- Mathematical Sciences
- Neuroscience
- Physics
- Scientific Computing

School of Computer Science:

- Computational Biology
- Computer Science
- Human-Computer Interaction
- Language Technologies
- Machine Learning
- Robotics
- Software Engineering

Tepper School of Business:

- Business Administration
- Innovation and Entrepreneurship
- Operations and Supply Chain Management

IDEaTE

The Integrative Design, Arts and Technology (IDEaTE) (<http://ideate.cmu.edu>) network offers students the opportunity to become immersed in a collaborative community of faculty and peers who share expertise, experience, and passions at the intersection of arts and technology. Students will engage in active "learning by doing" in the IDEaTE@Hunt maker spaces based in Hunt Library. The program addresses current and emerging real-world challenges that require disciplinary expertise coupled with multidisciplinary perspectives and collaborative integrative approaches.

The IDEaTE undergraduate curriculum consists of eight interrelated concentration areas, all of which can be shaped into minors that students pursue alongside their primary majors. The themes of these areas integrate knowledge in technology and arts:

- **Game Design:** Enhance your knowledge of key component areas of games such as dramatic narrative and character development, programming and engine development, game assessment and redesign. Create games for varied platforms from mobile devices to home entertainment systems and theme parks.
- **Animation & Special Effects** (<http://coursecatalog.web.cmu.edu/schoolofcomputerscience/addmajorsminors/#ideateminors>): Explore the technical and artistic aspects of 3D and 2D animation in an integrated manner and within different application contexts (from film animation and special effects to interactive displays).
- **Media Design:** Learn to design digitally mediated experiences across different platforms, from mobile apps to large-scale installations, and for varied applications (from media for daily living to mediated performances).
- **Learning Media:** Design effective new media systems for learning using new technologies, learning science principles and media arts knowledge. Produce engaging and effective experiences from games to tangible learning tool kits and remote systems.
- **Sound Design:** Create experimental music or explore new, technology-enabled applications and markets for sound design, music creation, and performance.
- **Innovation and Entrepreneurship:** Work collaboratively in hands-on explorations of the complete 21st century innovation ecosystem. You will experience integrated models of innovation that increase the likelihood of home-run products and services that will captivate society and/or the marketplace.

- **Intelligent Environments:** Develop spaces and devices that support efficiency and high quality of experience, in contexts like daily activity, built environment, making process (from laying plaster to robot development), and arts performance.
- **Physical Computing:** Build interfaces and circuitry to embed in physical contexts, such as mobile environments and new creative practice instruments.

Individuals who make significant contributions, academically and professionally, in these areas are solidly prepared in a related discipline. Their preparation is combined with the ability to work in multidisciplinary teams that span technology and the arts. IDEaTE serves as a multidisciplinary collaborative learning addition to the education (and learning outcomes) that students receive through their disciplinary major rather than a standalone learning experience.

Innovation and advancement in the eight IDEaTE concentration themes, as in many complex areas of inquiry, is the result of collective inquiry and requires deep expertise in all contributing areas of knowledge (i.e. expert technologists and artists). Carnegie Mellon is the only university in the United States with top ten ranked units in all key technological and arts domains involved in the eight IDEaTE concentrations. With these resources, Carnegie Mellon is uniquely positioned to create faculty and student teams that contain all necessary, high-level expertise in tech-arts areas of inquiry.

Students who participate in IDEaTE will be able to combine the unique experience of a "deep dive" in their chosen discipline while connecting to the diverse areas of knowledge and skill across the university. To help facilitate this experience, the educational objectives of the IDEaTE concentrations and minors are:

- Students from any undergraduate major can integrate a tech-arts area of study into their curricular plan and professional exploration through the IDEaTE concentrations/minors, which enhance and synthesize the tech-arts ecosystem at CMU.
- Students in IDEaTE have the opportunity to:
 - Immerse themselves in a collaborative community of faculty and peers who share expertise, experience, and passions at the intersection of arts and technology
 - Engage in active "learning by doing" in maker spaces
 - Address current and emerging real-world challenges that require disciplinary expertise coupled with multidisciplinary perspectives and integrative approaches.

To complete a minor, the student will take a total of 5 courses (4 for a concentration): one cross-training (portal) course, three courses in their chosen area (two for a concentration), and one more IDEaTE course, either from their chosen area or from a different concentration theme. IDEaTE will allow up to two minor courses to double-count for other requirements.

Across the eight concentration themes there are over 50 multi-disciplinary technology-arts courses that a student can choose from to customize their paths. Students are assisted in their choice of theme area and in the structuring of their path by a dedicated IDEaTE advisor who works in tandem with the advisor in their home unit.

The *cross-training courses (portal courses)* introduce students to the concepts and practices of knowledge areas beyond their discipline that contribute to the subject of each minor/concentration. After completing the portal courses, students should be able to (1) interpret cross-disciplinary communication from their collaborators (and use that interpretation productively in the collaborative work), (2) translate their own disciplinary expertise to describe ideas and outcomes in a way their cross-disciplinary collaborators can understand, and (3) develop interdisciplinary tech-arts prototypes (that include perspectives from multiple disciplines and enable further interdisciplinary communication and collaboration).

The remaining courses of IDEaTE are *collaborative courses*. Each course is focused on a key aspect of the area that it is categorized under. By taking these courses, the student can become familiar with many of the technical and creative issues in the area of the minor and the collaborative processes they entail. These courses are branded as collaborative because they promote hands-on learning through making, critique, and iterative design and they promote learning from both the instructor and the interdisciplinary peer cohort. At the conclusion of each collaborative course a student should be in a position to collaboratively plan and implement an established outcome in the area of the studio within a limited amount of time and apply skills from both technology and arts disciplines to prototype ideas and leverage the diversity of perspectives to produce innovation in the field.

A completion of a minor/concentration should provide multidisciplinary training in the area of the concentration and furthermore *enhance collaborative learning experience and skills of students*: diversify the cohorts of the student, enhance collaboration skills, promote cognitive versatility, facilitate skill transfer across technology and the arts, and produce graduates that can innovate in 21st century creative industries.

For more information, please visit the IDEATe website (<http://www.cmu.edu/ideate>).

Pre-Law Advising Program

Director: Joseph Devine, Associate Dean for Undergraduate Studies, Dietrich College

Office: Dietrich College Dean's Office, Baker Hall 154
www.cmu.edu/pre-law

"Law School" is an objective that students frequently mention when asked about post-baccalaureate plans. It seems in its brevity to be a simple enough answer, but in reality it masks a host of complex and momentous personal decisions and strategic tasks.

First and foremost, seeking entry into law school implies an informed decision about the rigors of law school and the realities of professional life as an attorney, as well as a strong and mature commitment to achieving these objectives at significant cost and investment (financial, personal, and intellectual). Second, it implies an understanding of the prolonged sequence of steps involved in the process of selecting law schools to which to apply, actually applying, ultimately selecting a school to attend, financing a law school education, and succeeding in law school. Finally, it implies an understanding of this as one of many options that should be carefully considered before a choice is made that will so significantly influence the course of one's personal and professional life.

To address these needs, the university offers a pre-law advising program for students and alumni/ae who are contemplating or actively seeking to enter law school. The program consists of a range of support services, coordinated centrally, designed to assist these groups in engaging the complex questions associated with decisions about law school, and in successfully negotiating the sequence of tasks associated with selecting, applying and gaining admission to the best law schools possible.

The emphases of this program are:

- early identification of pre-law candidates;
- stimulation at early stages and throughout this process to consider the essential questions of personal suitability for law school and professional life as an attorney;
- engagement with meaningful substantive issues rooted in the law that illustrate the intellectual complexities of our legal system and the corresponding intellectual acumen needed to enter and thrive in this profession;
- timely direction in designing and executing a well-planned law school research, selection and application strategy;
- gathering and using accurate data on university alumni entering law school and the legal profession.

The program proper consists of several components, organized and made available as an ongoing service to all students and graduates of the university. These components include periodic workshops and seminars, a pre-law web site, a pre-law newsletter, and linkage with law school admissions offices, the Law School Admissions Council, and associations (both regional and national) of pre-law advisors. The program also works closely with the student Pre-law Society.

Two early admission options are available to Carnegie Mellon undergraduates interested in either of Pittsburgh's two law schools: the Duquesne University School of Law, and the University of Pittsburgh School of Law. Requirements and procedures vary for each option. Interested students should meet with the university pre-law advisor before the end of their junior year.

Department of Athletics & Physical Education

Please see Department of Athletics & Physical Education (<http://coursecatalog.web.cmu.edu/servicesandoptions/departmentofathleticsandphysicaleducation>).

Reserve Officers' Training Corps (ROTC)

Please see Reserve Officers' Training Corps (ROTC) (<http://coursecatalog.web.cmu.edu/servicesandoptions/rotc>).

Study Abroad

Carnegie Mellon students from every major may be able to study in any part of the world for a semester, year or summer. Short-term programs during spring and winter break are also possible. A well planned study abroad program, in coordination with one's academic advisor, will allow a student to receive credit for study abroad and graduate on time. Most students study abroad during their junior year; however, a growing number of students are studying abroad during their sophomore and senior years.

The study abroad advising staff offers general information sessions as well as individual advising appointments to assist students in all stages of the study abroad process. The Office of International Education (OIE) has a large in-house library as well as useful web links to help students find the most appropriate study abroad program. In addition, OIE offers orientations to help with personal, academic and acculturation issues, before and after a study abroad experience.

Carnegie Mellon offers students a variety of payment options for study abroad to allow students to study abroad regardless of financial need. There are three categories of programs: Exchange Programs, Sponsored Programs, and External Programs. A description of each program follows. More detailed information can be found at www.cmu.edu/studyabroad.

Exchange Programs

Students who participate in exchange programs pay Carnegie Mellon tuition and receive their regular financial aid package. Students are responsible for room, board, travel and miscellaneous expenses.

University Exchanges

Carnegie Mellon University has university-wide exchange programs with institutions located in Australia, Chile, Hong Kong, Israel, Japan, Mexico, Qatar, Singapore, and Switzerland.

Departmental Exchanges

Architecture, Art, Chemical Engineering, Design, Drama, Electrical and Computer Engineering, English, Heinz College, Information Systems, Materials Science and Engineering, Modern Languages, Computer Science and Business offer departmental exchange programs. Students should contact their department or the study abroad website for additional information.

Sponsored Programs

The university has designated a few study abroad programs administered by other organizations or universities as sponsored programs. To participate in these programs students pay a university fee equivalent to current tuition, room and board, and retain their eligibility for all financial aid. Carnegie Mellon in turn pays the program costs to the study abroad sponsor. Where applicable, funds are distributed to the student for room, board, travel, and personal expenses.

Currently Carnegie Mellon has 38 sponsored programs available around the world. A full list can be found at www.cmu.edu/studyabroad or in consultation with a study abroad advisor.

External Programs

Students may also participate in a program sponsored by another university or study abroad organization if the student's home department approves the program and its course offerings. Students will pay the other organization or institution directly. Students who receive institutional aid from Carnegie Mellon will not be eligible for this aid while they are abroad. However, students with state and federal aid will still qualify. Students can learn more about external program options during study abroad advising appointments and by exploring the study abroad website and library.

University Student-Defined Major

Carnegie Mellon offers the opportunity for undergraduate students to pursue a University Student-Defined Major. (There are also opportunities to pursue

a Student-Defined Major in some of the colleges [see relevant college section of the catalog]). For information and advice, interested students are encouraged to speak to the Associate Dean (sic) of their current home college or the college most relevant to the proposed course of study.

The requirements for successful completion of a University Student-Defined Major include a student proposal approved by an advisor, relevant college(s), and the Provost, and successful completion of the approved course of study. In brief:

- A student interested in pursuing a university student-defined major must develop a proposal which outlines an intellectually coherent area of study (with degree title) and a plan of study (courses to be taken, pedagogical rationale, proposed schedule). The proposal should include an explanation of why it is not appropriate or possible to pursue such a program through the curriculum of any one of the colleges. It should outline a program of study for both general education (for example, the core requirements of one of the most relevant colleges or equivalent general education plan) and major requirements. The proposal should designate one of the participating colleges as defacto "home college" for tracking and verification purposes.
- The student's proposal must be approved by a faculty advisor within a college who takes pedagogical responsibility for the program, by the defacto "home college" and by any other colleges involved in granting the degree. The signed proposal will be submitted to the Provost's office for a final review and approval.
- Once approved by the faculty advisor, colleges, and the Provost's office, the student's major will be administered by the advisor and his/her progress tracked by the Dean's office of the "home college." The "home college" will be responsible for monitoring the student's progress and reminding any collateral colleges of the approval of the student-defined major so that these colleges may insure the student's ability to enroll in the necessary courses. Upon successful completion of the course of study, the "home college" will be responsible for contacting all the relevant colleges and verifying the completion of the degree. Unless there are sufficient numbers of university student-defined majors in any graduation year, upon consultation with the "home college," students may chose to receive the diploma in the most relevant department's ceremony.

Student-Taught Courses (StuCo)

The Student College (StuCo) was established in 2001 to provide Carnegie Mellon students with the opportunity to share knowledge through educational, self-designed courses. Students can teach classes on any topic of their choice. However, the course cannot be available through regular University offerings. Courses typically meet once a week (for a full semester) and follow the current Carnegie Mellon academic calendar. Instructors and students receive credit (3 elective units - pass/no pass) for their work.

- All CMU students are eligible to teach StuCo courses and to join the Executive Committee that governs StuCo.
- All currently-enrolled CMU students, staff and community members are eligible to take StuCo courses.
- StuCo classes are taught during the fall and spring semesters.

StuCo courses vary semester to semester. Some examples of current classes offered by StuCo for Fall 2016 include:

- 98-012 Student Taught Courses (StuCo): Fun with Robots
- 98-128 Student Taught Courses (StuCo): Fundamentals of Improv Comedy
- 98-186 Student Taught Courses (StuCo): Roller Coasters: Background and Design
- 98-222 Student Taught Courses (StuCo): Introduction to IOS Development
- 98-272 Student Taught Courses (StuCo): Financial Freedom
- 98-291 Student Taught Courses (StuCo): Android Development

For detailed information on the Student College, please visit the StuCo website (<http://www.cmu.edu/stuco>).